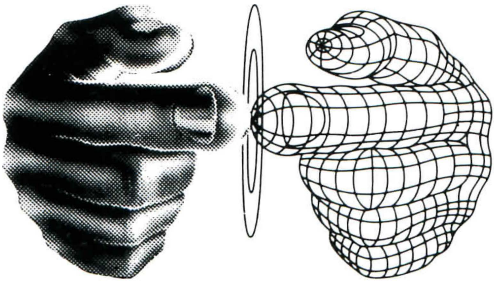
NEC TREK™
PERSONAL COMPUTER SERIES
PC-6000A SERIES USERS GUIDE

6 X $
BLAMM! KRAAAKK
Dear Miss Good:
oui
Buon giorno
Buenos Dias!

Adventure at your fingertips

NEC

THE NEC HOME ELECTRONICS
PC-6000 A SERIES
USER'S GUIDE



Published by:
NEC Home Electronics (U.S.A.), Inc.
1401 Estes Avenue
Elk Grove Village, Illinois 60007
312/228-5900

The NEC PC-6000 A User's Guide

Congratulations . . . You've taken the first step on a memorable adventure. At your fingertips is a powerful state-of-the-art computer system that will assist and delight you - at both work and play.

We all know what it's like to get something new and exciting Most of us have a tendency to want to get everything unpacked Quickly! "Let's get started," we think "we'll worry about the details as they come up" This tendency usually leads to unpacking boxes, pulling cords and cables from here and there, and attaching them to this and that. Turn the power on. Let's go.

Like all great adventures the one you are about to embark on should be done with a certain amount of planning We'd like to offer you an important bit of advice on getting the most from your PC6000 A system. **As anxious as you must be, please take the time to read all of Section I before you install the PC-6000 A system.** Section I will fill you in on some important information that you'll use time and again as you work with your new computer.

Take time to get acquainted with your PC-6000 A computer. Once you learn about all of its features and operation, you'll see how easy and exciting the computer adventure can be.

Special Note: Pamphlets are provided with all of the PC-6000 A series components. You will find it very handy to keep all of these pamphlets together with this User's Guide for quick and easy reference

TABLE OF CONTENTS

SECTION I **An Adventure at Your Fingertips**

Chapter 1 Meet the PC-6001 A Computer
Chapter 2 How to Use the Manual

SECTION II **Getting Started**

Chapter 3 Installation of the PC-6000 A Series

A. PC-6001 A Keyboard
B JC-1212/JB-1201/JB-1260/JB-902 Monitors or TV Set
C. PC-6082 A Cassette Recorder
D. PC-6021 A Thermal Printer
E. PC-6051 A Expansion Unit
F. PC-6011 A Expansion Unit
G. PC-6031 A Disk Drive

Chapter 4 Operating your PC-6001 A

A. Screen Definitions
B Keyboard Definition
C. Loading Software

SECTION III **The Sophisticated Computer System**

Chapter 5 The Cassette Recorder (PC-6082 A)
Chapter 6 The Thermal Printer (PC-6021 A)
Chapter 7 The Touch Panel (PC-6051)
Chapter 8 The Expansion Unit (PC-6011 A)
Chapter 9 The Disk Drive (PC-6031 A)
Chapter 10: The RS-232C Interface
Chapter 11: The Monitor
Chapter 12: The Dot Matrix Printer (PC-8023A-C)

SECTION IV **Technical Information**

INDEX

Calculations, performing 5
Cartridges, use of 34
Cassette Tapes
  Audio Tapes 43
  Care of 42
  Digital Tapes 43
  Insertion 44
  Loading 45,46
  Write Protect 43
Character Chart, Keyboard 102
Character, Alternate Set 103
  Special Characters 103
Components, specifications 105-107
Computer Console 3
  Installation 13
Connector Output 108-109

INDEX (cont'd)

Data Recorder 4,6,37
  Installation 16
  Maintenance Tips 50
  Troubleshooting 51
  Use of 38
Disk Drive 4,6
  Installation 20,21
  Troubleshooting 81
  Use of 68, 69
Diskette
  Back-up 13
  Care of 24,25
  Format 70
  Inserting 68
Dot Matrix Printer 85

Expansion Unit 4,37
  Installation 19
  Maintenance Tips 65
  Troubleshooting 66
  Use of 64
  Using Cartridge 64
  With Disk Drive 64

Functions 29

Games 7
Graphics 37
Graphic Symbols 104

Installation 12

Joystick 35

Keyboard 3,6,30-33
  Character Charts 102

Memory Maps 94-101
Monitor 14
  Installation 14,15
  Using 84
Music 37

PC-6000 A Series Product Table 91
PC-6001 A Specifications 86,87
  Features 88
Power Off 26
Power On 26
Programming 8
Program Samples 111-113

RF Modulator 3
RS-232C Interface 82

Saving a Program
  On Disk 69
  On Tape 47,48
Software, Packaged 8
Sound Generator 3
System Specifications 92,93

INDEX (cont'd)

Tape, Demonstration 49
Thermal Printer 4
  Installation 17
  Loading Paper 53
  Maintenance Tips 55
  Programming Considerations 110
  Removing Paper 54
  Troubleshooting 56
  Use of 53
Touch Panel 4,7,37,57
  Drawing On 58
  Installation 18
  Loading Paper 58
  Maintenance Tips 61
  Removing Paper 60
  Troubleshooting 62
  Use of 62

Video Monitor 4

NOTICE

"This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception It is a T.V. interface Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. This includes the PC-6001 A and all its PC-6000A Series optional peripherals manufactured by Corporation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does not cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- reorient the receiving antenna
- relocate the computer with respect to the receiver
- move the computer away from the receiver
- plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult an NEC authorized dealer or an experienced radio/television technician for additional suggestions The user may find the following booklet prepared by the Federal Communications Commissions helpful

"How to Identify and Resolve Radio-TV Interference Problems". This booklet is available from the U.S. Government Printing Office, Washington, D.C., 20402, Stock No. 004-000-003454"

WARNING: This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and T.V. reception.

SECTION I

An Adventure at Your Fingertips

Section I of this User's Guide will introduce you to the PC-6000 A Series Home Computer System. Many helpful tips are presented here. We'll tell you how to use the PC-6000 A for making your life easier and more fun. We'll point out specific computer activities throughout this User's Guide that you may find useful. Following these directions will make all adventures aboard the PC-6000 A safe and exciting. Bon voyage.

Chapters:

1. Meet the PC-6000 A Computer Series

2. How to Use the Manual

Take The NEC-TREK

With your PC-6000 A Home Computer System you are about to take an expedition that would boggle the minds of many people Your PC-6000 A is ready for tomorrow, today. Together you can search out and find the solutions to many of your questions and journey to new worlds; you can pursue avenues of fantasy and adventure which previously were nothing more than "the stuff that dreams are made of."

Let your NEC Home Electronics PC-6000 A be your navigator Whenever you want to explore a new possibility, you merely communicate that idea through the computer keyboard and you get results. And your NEC Home Electronics PC-6000 A is ready when you are It's ready, day or night, to play a game, solve a tough problem, and teach you new things

You're One of the Early Explorers

As the owner of the PC-6000 A Computer, you are one of a very unique group of "early adventurers". I'm sure you've read a good deal about this being the "age of the computer" and you're certainly aware of the importance that computers have in industry and education. But think of the number of people who actually own a computer. That figure is really quite small.

The first astronaut's trip into space lasted only minutes. From there, space travel evolved from orbitting the earth to exploring the moon to launching a space shuttle that can visit space and return to earth again and again Even with all these amazing accomplishments, the space age is in its infancy.

The age of personal computer systems is also in its early stages. The full potential is yet to be realized. As one of the early adventurers of the computer age, you will explore new "worlds" just like the early astronauts.

Chapter 1:
Meet the PC-6000 A Computer Series

The PC-6000 A Personal Home Computer System is made up of "component parts". Each of the components of the PC-6000 A system plays an important role in making this system extremely versatile, and yet easy to use. The brain of the PC-6000 A System is the PC-6001 A computer console that contains its own keyboard. It is here that the computer "processing" takes place. The other components are an extension of this, like the eyes, ears and other senses that make a complete body.

The Computer Keyboard

The PC-6001 A computer console gives you the power to make your system come alive. You control every activity through the keyboard. In fact, the PC-6001 A console is a complete computer within itself. It is here that you take charge and say "I want to print a report" or "I want to play this game". The other components hook-up to the console and the PC-6001 A drives them. Within this unit there is the computer power to perform a multitude of functions. The PC-6001 A console comes already equipped with 16K ROM and 16K RAM expandable to 32K ROM and 32K RAM memory. Other built-in features include a BASIC interpreter so that it understands the BASIC program language, a sound generator so advanced that it can actually play chords and an RF modulator which allows you to use an ordinary TV set as your monitor.

Through the PC-6001 A console you will be able to create your own music, type your own letters and reports, solve mathematical problems, keep records of your work and write your own computer programs You can even talk to other computers. The list goes on and on

The Video Monitor or the Home TV

You can use either a Video Monitor, like the NEC Home Electronics JC-1212, or your home television with the PC-6000 A Series Whichever you choose, it is here that you view the working of computer activities as they take place The NEC Home Electronics monitors offer high quality display for clear, sharp images while leaving the TV available for normal viewing

The Data Recorder PC-6082 A

The Data Recorder is designed to record the information that you enter into the computer so you can use it again and again. It allows you to easily load new programs and save the programs that you create. It also offers features such as the NEC Home Electronics Search and Play System, which makes data and program retrieval a snap. And load level control for sure and consistent loading of programs.

The Thermal Printer PC-6021 A

Because you want to keep a paper copy of just about everything you use the computer for, the thermal printer lets you print out programs, letters and reports, graphic illustrations, worksheets and hundreds of other kinds of information. The Thermal Printer hooks directly to the console for easy installation. It is so quiet when operating that you can barely hear it.

The Touch Panel PC-6051 A

You can create a variety of graphic images through the Touch Panel - graphs, bar charts, cartoons and other sophisticated graphics With the Touch Panel, and appropriate software, what you draw on paper is what you see on the screen. The whole family can have fun creating "electronic masterpieces"

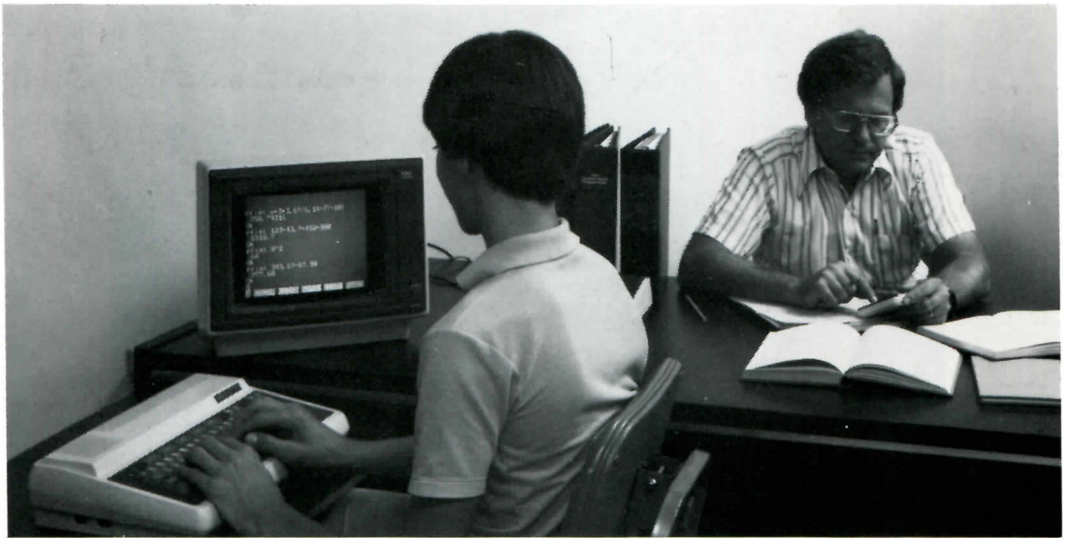
The Expansion Unit PC-6011 A

The Expansion Unit can double the power (memory) of your PC-6001 A computer. With the Expansion Unit, and the use of multiple ROM & ROM/RAM cartridges or extended BASIC, you can create larger, more sophisticated and more powerful computer programs. In addition, with the Expansion Unit as part of your system you can store programs and other data on the PC-6031 A Disk Drive.

The Disk Drive PC-6031 A

Instantaneous program and data retrieval is available for your PC-6000 A through the Disk Drive. The disk unit lets you save an additional 140,000 (140 K) characters of information on a single floppy disk With the disk drive you get the speed and efficiency of an expensive computer in your living room.

It's A Calculator



Complex calculations can be easily performed by the PC-6000 A Series computer system. Using your computer it's possible to set up programs that can maintain a running balance (keep a close eye on the checkbook) You can add, subtract, multiply and divide, even perform algebraic equations You can store both the formula and the results and retrieve them whenever you desire.

It's A Typewriter

You'll notice that the PC-6001 A has all the keys found in a standard typewriter, plus many special ones. If you can use a typewriter, you can easily use the PC-6001 A keyboard.

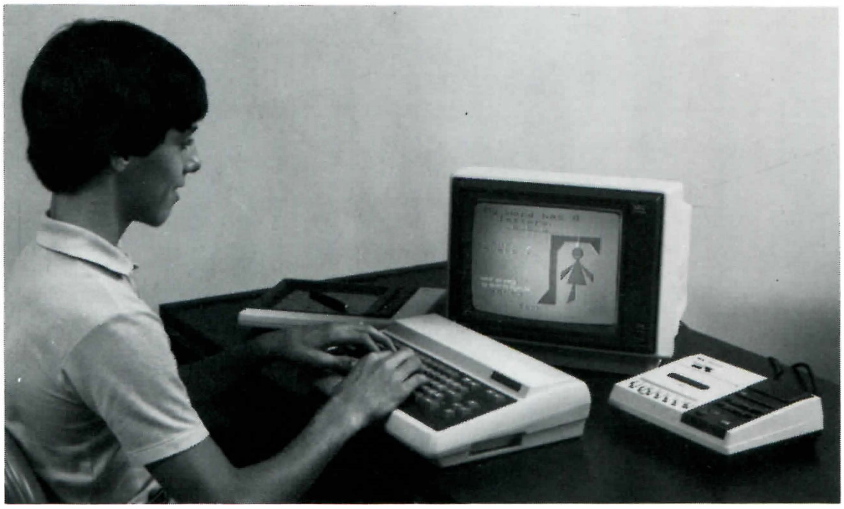
Besides writing programs and playing games, this keyboard can, with appropriate software become a word processor. You'll be able to write memos, notes, letters and full reports. You'll be able to save these documents on cassette tape or floppy disk and retrieve them at any time.

It's a Filing Cabinet

A computer's real strength is its ability to file and organize information, and the PC-6000 A System is right up there with the best. The Data Recorder lets you keep tape after tape of recorded information, loading it into the computer whenever you need it. The Disk Drive creates even more speed and efficiency when it comes to organizing information.

Your PC-6000 A System is like having row after row of filing cabinets at the tips of your fingertips.

It's A Video Arcade

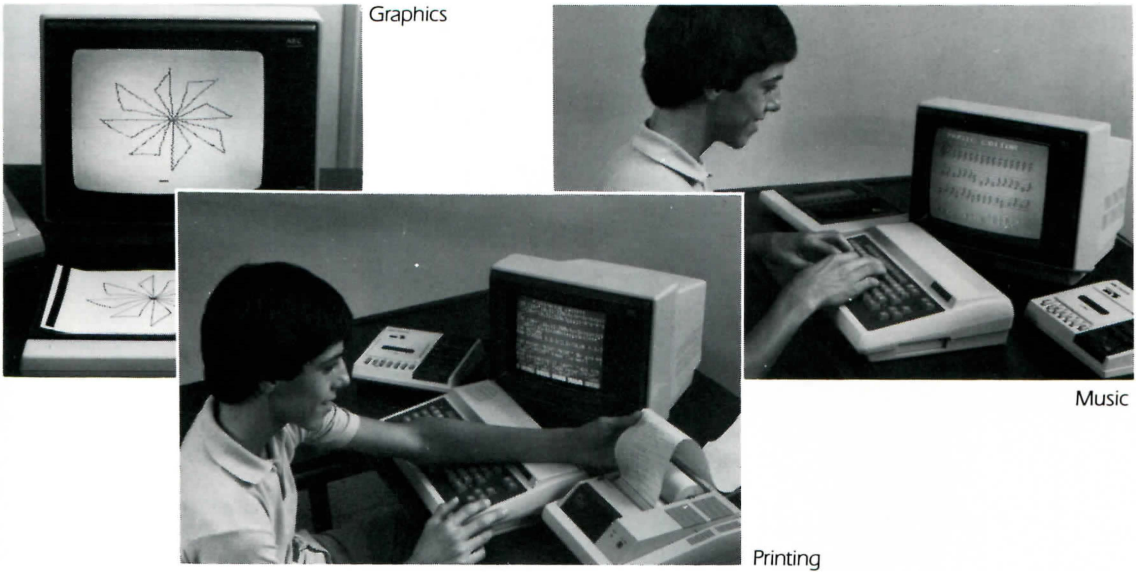


There is no need to spend your time and money at the local acrcade, not when you can battle the invaders from space in the comfort of your home. A number of game programs are already available for your PC-6000 A System with more on the way. And many of these can only be played on the PC-6000 A computer. If you're an inventor at heart, you can even program your own games through the easy-to-use N-60 BASIC language built right into your console.

In A Class By Itself

The PC-6000 A System is a real classroom that offers you educational opportunities limited only by your imagination. And, depending on the program, you can be the student or the teacher. For example, with the optional Music Editor, or PLAY command which is included with N-60 BASIC, you can learn and even teach music in ways you never dreamed possible. The PC-6000 A System and its clever, entertaining graphics add spice to the learning experiences.

It Responds To You



Graphics

Music

Printing

The PC-6000 A System is responsive to your requests. Program a song and it will serenade you. You can get pictures, words and answers to questions by programming your computer. Draw a picture on the Touch Panel and it will display it and save it. Your PC-6000 A is always ready to talk to you, it never gets tired

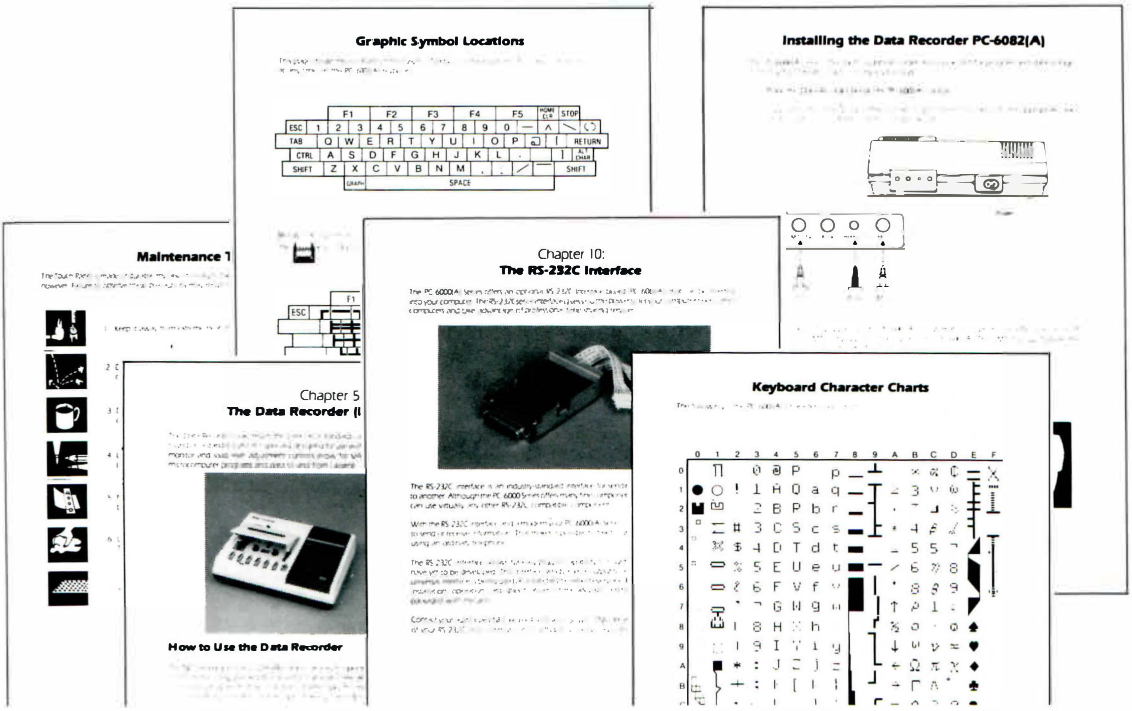
You Talk To It

A computer program, generally speaking, is a set of instructions for the computer to follow. The PC-6000 A has a library of packaged software (programs) available on cartridge, diskette and cassette for your use. But many people find unique situations where they'd like the computer to do something special The PC-6000 A can be easily programmed, for your individual processing needs. You can also change existing programs to meet your individual requirements

With your computer you received two manuals, the N-60 BASIC Reference Manual and this PC-6001 A User's Guide These books will teach you how to program and aid you when you have questions. The optional Adventures with N-60 BASIC will explain everything you need to know to get started writing your own programs. The N-60 BASIC Reference Manual will answer many of your questions even after you have learned to program. Now you can really talk to the computer.

Chapter 2:
How To Use The Manual

Consider this manual to be your map for a successful journey. Just as a map is intended to give you direction, so is this book.



Graphic Symbol Locations

Installing the Data Recorder PC-6082(A)

Maintenance T

Chapter 10:
The RS-232C Interface

Chapter 5
The Data Recorder (I

How to Use the Data Recorder

Keyboard Character Charts

The NEC PC-6000 A Series User's Guide is designed to give you reference information about the entire system. If you have all of the components of the PC-6000 A series, we suggest that you read the entire manual from cover to cover. You will see how each of the components works and how to get the most from your system.

Section I gives you a general idea of what the PC-6000 A System is and how you are going to use it.

Section II gets you started using your computer. It supplies information on installing each of the components and discusses the operation of the PC-6001 A keyboard.

> Chapter 3. gives you step-by-step instructions for installing the components.
>
> Chapter 4. discusses the operation of PC-6001 A keyboard. We recommend that you read this chapter before turning on your PC-6001 A system. It is likely that you will reference this chapter often - particularly regarding the use of your system's many special keys.

Section III presents detailed information about how to use each of the components of the PC-6000 A System. It also covers the care and maintenance of the different components. It contains instructions for loading the programs on the demonstration tape which gets you acquainted with your system's built-in features.

Chapter 5. tells you about the operation of the Data Recorder. We recommend that you read this chapter through before using the PC-6082 A Data Recorder to insure that you can save and load your programs successfully the first (and every) time. This chapter tells you how to care for and use the Data Recorder and cassette tapes, how to load a program, how to save a program, and maintenance tips for the Data Recorder. You will find this chapter particularly useful as an easy reference to the control and operation of the Data Recorder.

Chapter 6. is a detailed overview of the Thermal Printer including basic operation, care and use of the printer, how to load paper, printing reports or graphic images You will also find this chapter useful as a reference to programming operation of the printer if you are creating your own programs with printing capability.

Chapter 7. tells you about operation of the Touch Panel. It also tells you how to care for and use the Touch Panel.

Chapter 8. tells about the Expansion Unit This chapter tells you how to care for and use expansion unit. It is unlikely that you'll need to reference this information (it's so easy to use) Should you find it necessary, the chapter is presented in reference format.

Chapter 9. tells you both technical and reference information about the Disk Drive. We recommend that you read this chapter through before operating the PC-6031 A Disk Drive. This chapter tells you how to care for and use the Disk Drive, care for and use the diskettes, how to load a program, how to save a program, write protect the program diskettes, and maintenance tips for the disk unit. You will find this chapter useful for easy reference of the PC-6031 A Disk Drive.

Chapter 10 tells you about the optional RS-232C interface function, location and basic operation. You will find this chapter useful for taking part in a computer network or taking advantage of time-shared services.

Chapter 11. gives reference information about the NEC Home Electronics monitors This chapter tells you how to care for and use the monitors. You will find this chapter useful when selecting a monitor to use in place of your television set.

Chapter 12. gives you reference material about the PC-8023A-C Dot Matrix Printer. We recommend that you read this chapter before operating the printer. You will find this chapter a quick reference guide to the operation of the printer.

Section IV is a compilation of specifications and other important technical information about your PC-6000 A System. As your technical and programming expertise grows, you will find this information helpful in understanding how your computer works.

SECTION II

Getting Started

Section II of this User's Guide presents information to get you started. The chapter on the installation of the PC-6000 A Series is structured as modular sections

You can start with the basic system which includes the PC-6001 A console and your T.V. or NEC Home Electronics monitor. Then you can add the components such as the Expansion Unit, Touch Panel, Thermal Printer, Data Recorder and Disk Drives as you acquire them.

Chapters

3. Installation of The PC-6000 A Series Home Computer System.
4. Operating Your PC-6001 A

Chapter 3:
Installation of the PC-6000 A Series

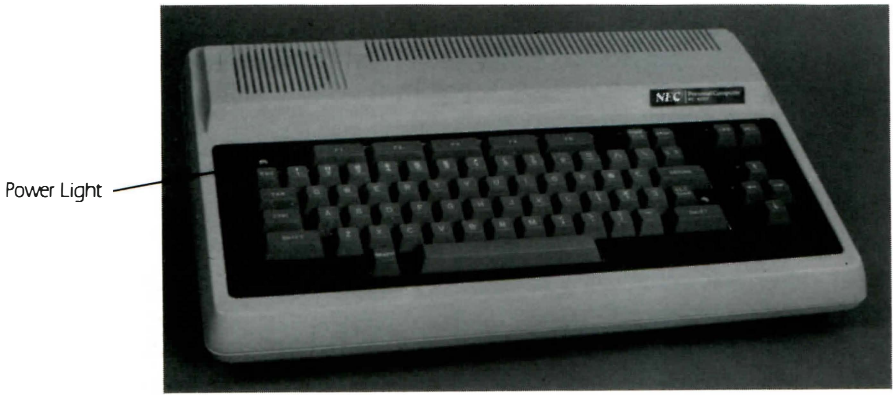
The PC-6000 A Series Home Computer System consists of the computer console (PC-6001 A) and a number of components that work with the computer to give you total computer power. The basic system consists of the PC-6001 A console and an NEC Home Electronics monitor or your home T.V. with the switchbox that is included with the console. With all of the optional components available for use with the PC-6001 A , like the Thermal Printer, Touch Panel, Expansion Unit and Disk Drives, the possibilities are almost endless This chapter describes how to install each of the components of the PC-6000 A series Each component has its own section in this chapter so that you can get started with the components you already have and you can refer to specific sections later when you decide to add components.

If you have the entire system now, which consists of the PC-6001 A console, a monitor or television, Thermal Printer, Touch Panel, Expansion Unit and Disk Drive or Data Recorder, you'll notice that each component is packaged in a separate carton. To set up the entire system simply step through each of the sections as they appear in this chapter. Soon you'll be creating graphic images, programming music and printing reports.

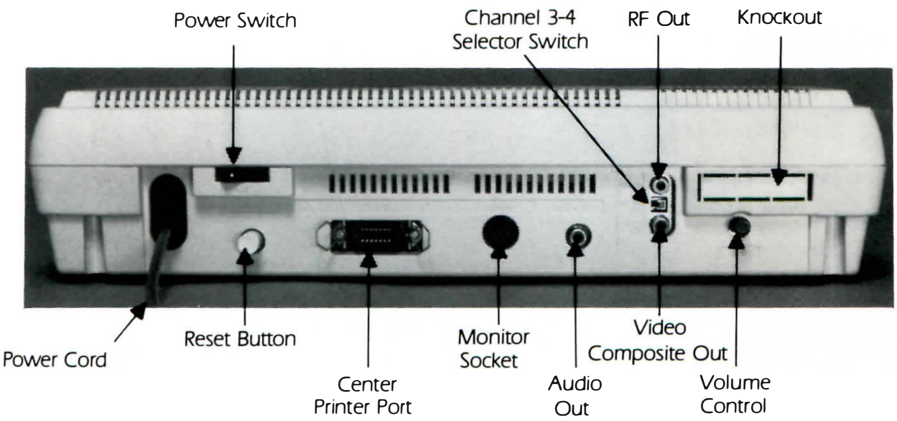
Installing the Computer Keyboard

The PC-6001 A console is the brain of the PC-6000 A system. It is through this that all of the other components operate and entries are made

Front View

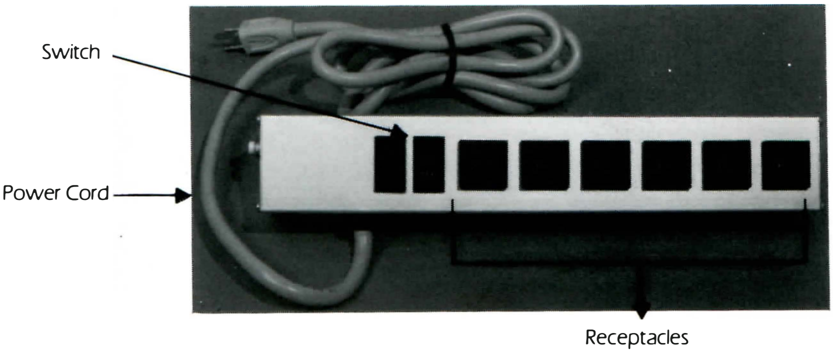

Power Light

Rear View


Power Switch
Channel 3-4 Selector Switch
TV RF Out
RS232 Knockout
Power Cord
Reset Button
Center Printer Port
Monitor Socket
Audio Out
Video Composite Out
Volume Control

1. Place the PC-6001 A on a table (or other flat surface) with room for each of the other components that you have. Be sure you have easy access to an electrical outlet with enough openings to handle the power cords from each of your components.

   An easy way to make sure you have enough power receptacles is to use a power strip. These can be purchased at almost any hardware or department store.


Switch
Power Cord
Receptacles

2. Plug the power cord into an electrical outlet or power strip

Now you are ready to begin installing the other components.

Connecting the NEC Home Electronic Monitor to the Console

The PC-6000 A series can be operated with your TV set or one of the following NEC Home Electronics Monitors

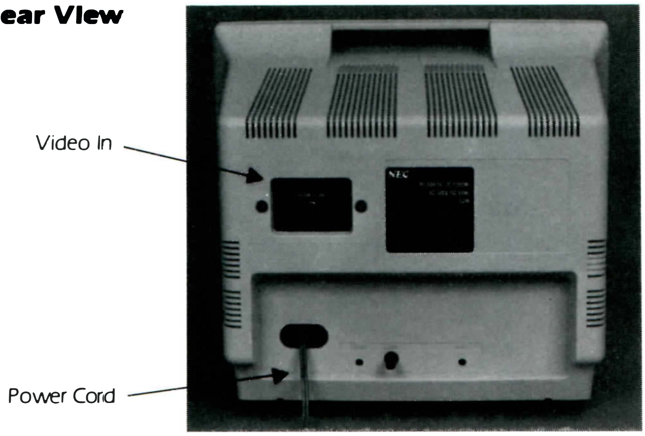
JB-1201 - 12 inch diagonal - green phosphor
JB-1260 - 12 inch diagonal - green phosphor
JC-1212 - 12 inch diagonal - color composite screen
JB-902 - 9 inch diagonal - green phosphor

The monitors are each installed as follows:

1. Place the NEC Home Electronics monitor about 12 inches behind the PC-6001 A console (this allows room for cables and connectors) For best viewing, the monitor should be just slightly below eye level.

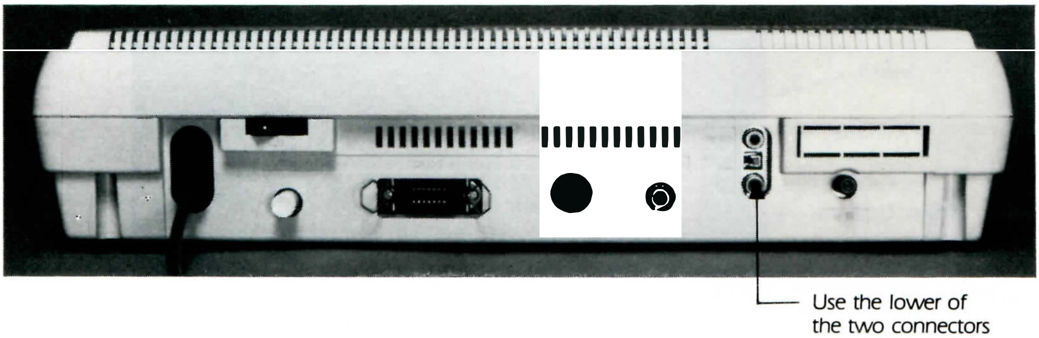
2. Plug one end of the monitor connection cable into the "video in" jack located on the rear of the monitor.

Monitor Rear View



NOTE: The JC-1212 monitor does not have the audio in and out connector.

3. Plug the other end of this cable into the "monitor out" jack located on the rear of the PC-6001 A computer keyboard.



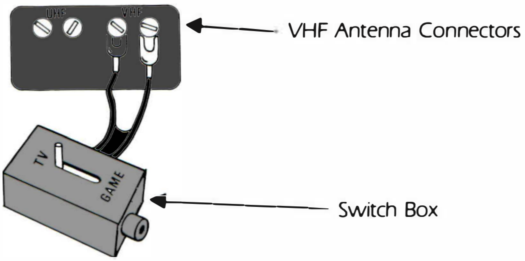
4. Plug the power cord into an electrical outlet or power strip.

Your monitor is ready to use.

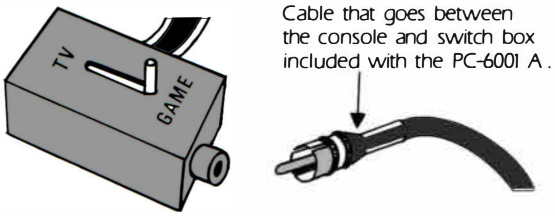
... Connecting Your Television Set to the Console

1. Place the television about 12 inches behind the PC-6001 A console. This allows room for cables and connectors. For best viewing, the television should be just slightly below eye level. (You will need the PC-6071 A switch box to use your T.V. with the computer. This switch box is included with the PC-6001 A console.)

2. Connect the TV/GAME switch to the VHF antenna connection on the back of the TV set. The flat leads attach to your T.V.'s VHF antenna connection.



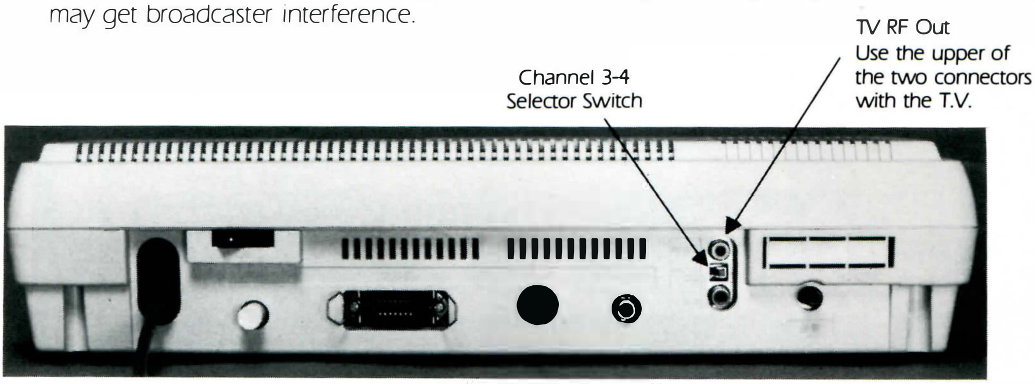
3. Plug one end of the coaxial monitor connection cable into the jack located on the TV/GAME switch assembly.



Cable that goes between the console and switch box included with the PC-6001 A .

When you are using the TV with the PC-6001 A computer you should put this switch in the "game" position. When you are using the TV for normal television viewing, move it back into the "TV" position and turn your computer off so that it does not cause interference with your T.V. reception.

4. Plug the other end of the coaxial monitor connection cable into the "TV RF Out" jack located on the rear of the PC-6001 A computer keyboard. In your location either channel 3 or 4 on your TV is not used by broadcasters. For channel 4 the channel selector switch is pushed in, for channel 3 it is in the out position. If you are on the wrong channel your system will work, but you may get broadcaster interference.



TV RF Out
Use the upper of the two connectors with the T.V.

5. Plug the power cord into an electrical outlet.

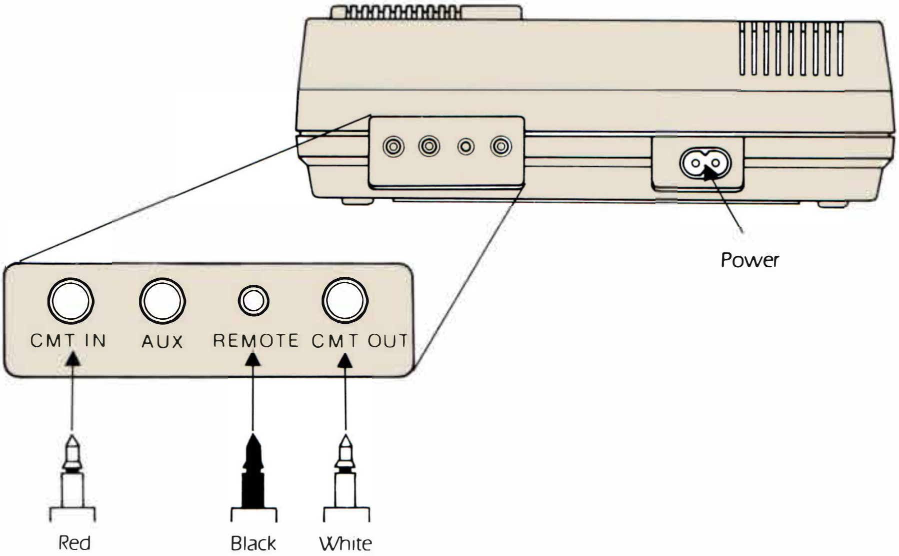
Your television is ready to use as a video monitor.

WARNING: Damage could result to your monitor or TV screen if the brightness control is turned on fully for a long period of time while using a program.

Installing the Data Recorder PC-6082 A

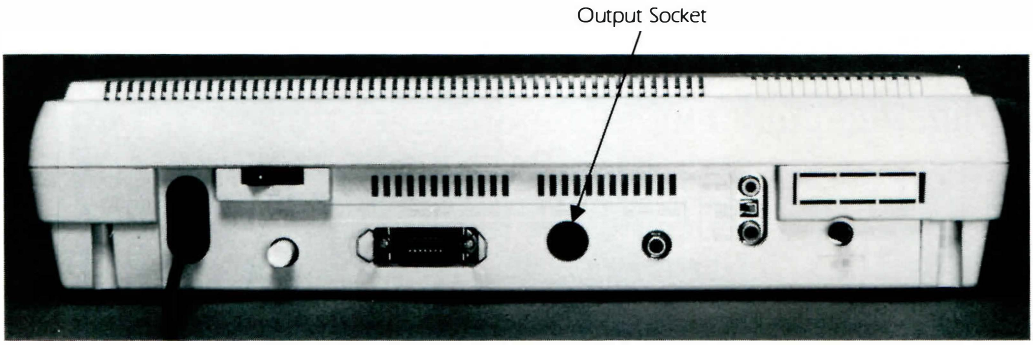
The PC-6000 A series offers both a Data Recorder and a Disk Unit for program and data storage. Installing the Data Recorder is a simple procedure.

1. Place the Data Recorder beside the PC-6001 A console.
2. Plug each of the male plugs of the Data Recorder Connection Cable into the appropriate jacks on the rear of the Data Recorder as shown below.



NOTE: The Remote plug allows the PC-6001 A to automatically turn the cassette drive on or off as needed. The CMT Out plug sends the signal to the PC-6001 A. The CMT In plug is where the received signal from the PC-6001 A is transmitted.

3. Plug the other end of the Data Recorder Connection Cable into the output socket located on the rear of the PC-6001 A console. Make sure that the slot on the end of the round connector is facing up.

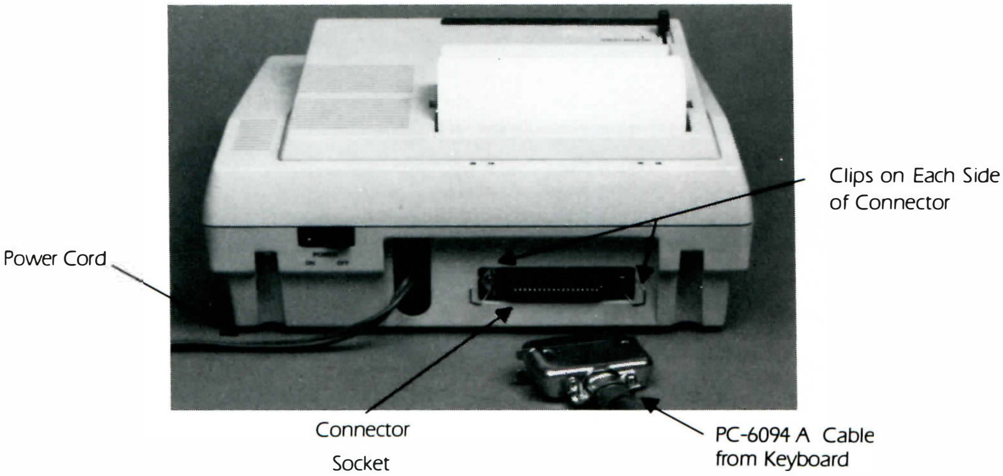


4. Plug the Data Recorder power cord into the wall outlet or power strip.

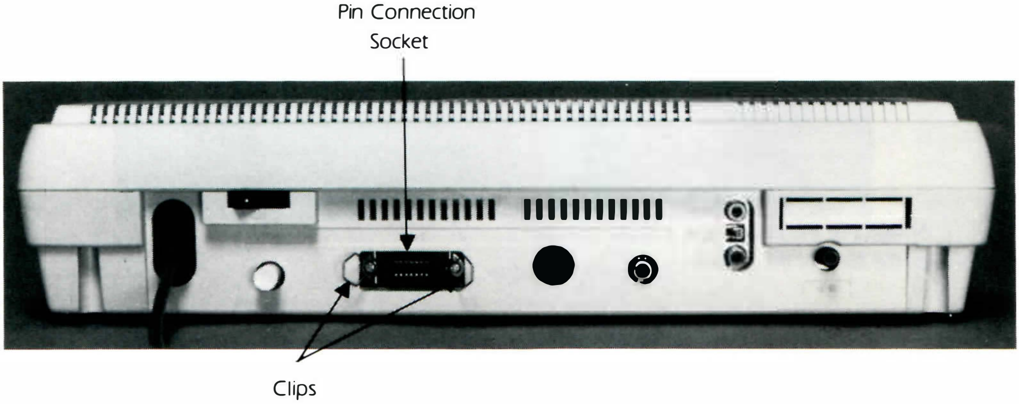
Installing the Thermal Printer PC-6021 A

The Thermal Printer lets you easily print alphabetic characters or graphic images. It's also very easy to install. Follow these simple steps:

1. Place the Thermal Printer to the left side of the PC-6001 A console.
2. Plug the Pin Connector cable (the larger of the two connectors) into the Pin Connection socket on the rear of the thermal printer.


Clips on Each Side of Connector
Power Cord
Connector Socket
PC-6094 A Cable from Keyboard

3. Once fully inserted, you can secure the connector to the printer by pulling the two clips into the slots located on the cord. See illustration above.
4. Plug the smaller end of the Pin Connector cable into the Pin Connection socket on the rear of the PC-6001 A console as shown below.


Pin Connection Socket
Clips

5. Once fully inserted, secure the connector to the console by pulling the two clips into the slots located on the cord as shown above.
6. Plug the power cord into an electrical outlet or a power strip you have purchased for your PC-6000 A Series Home Computer System.

   NOTE: Turn the power to the printer to ON then turn the power to the PC-6001 A ON.

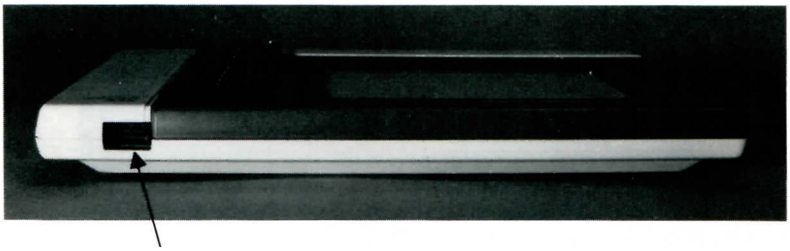
The Thermal Printer is ready to use.

Installing the Touch Panel PC-6051 A

The Touch Panel is powered by the PC-6001 A console. There is no power cord, only one connection cable.

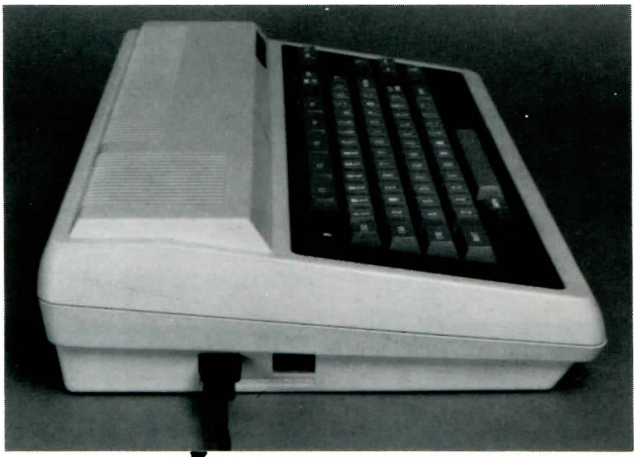
1. Place it on a flat surface to the left of the PC-6001 A console.
2. Plug one end of the interface cable into the slot located on the back of the Touch Panel.

Rear View of Touch Panel



Plug for Cable from Keyboard

3. Insert the other end of the cable into the joystick plug on the console. See the illustration.



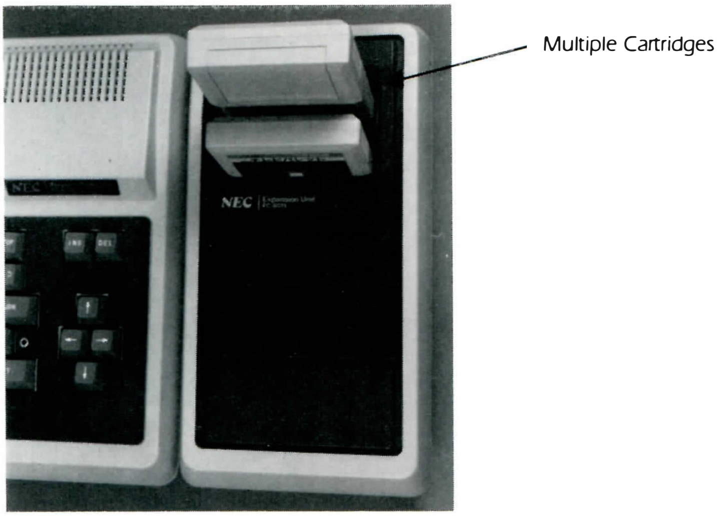
Always use the plug that is towards the back of the console.

A Touch Panel cartridge is included with the PC-6051 This cartridge is to be inserted into the side slot of the PC-6001 A or if the PC-6011 A is used, insert the cartridge into one of its three slots.

The Touch Panel is now ready to use.

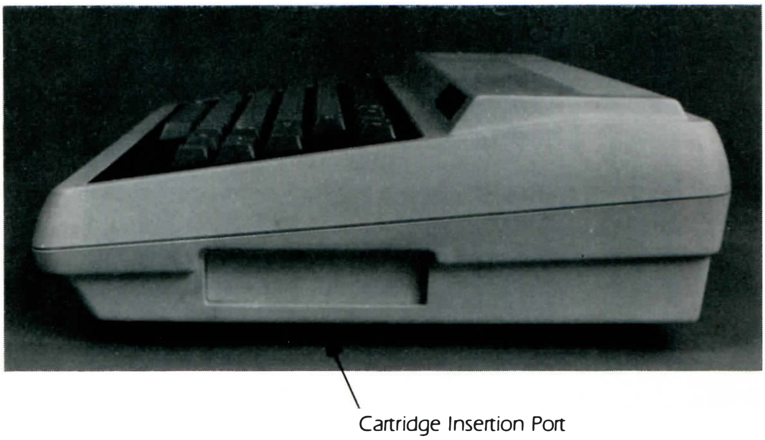
Installing the Expansion Unit PC-6011 A

The Expansion Unit lets you insert combinations of cartridges and therefore puts more power (memory up to 32K ROM and 32K RAM) at your fingertips. Installation is easy. It just pops in.

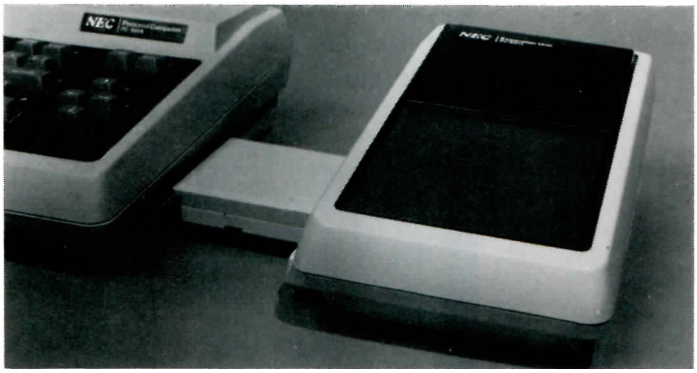


1. Insert the Expansion Unit into the cartridge insertion port located on the right side of the console as shown. Then push in the cartridge of the Expansion Unit thoroughly. If it's not fully inserted, you will not be able to turn on the power to the PC-6001 A .

Right Side View of Keyboard

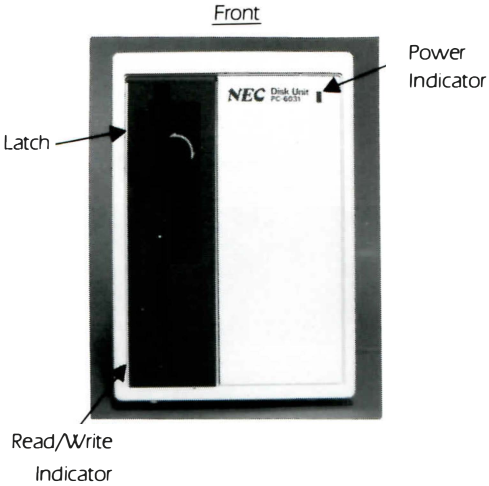


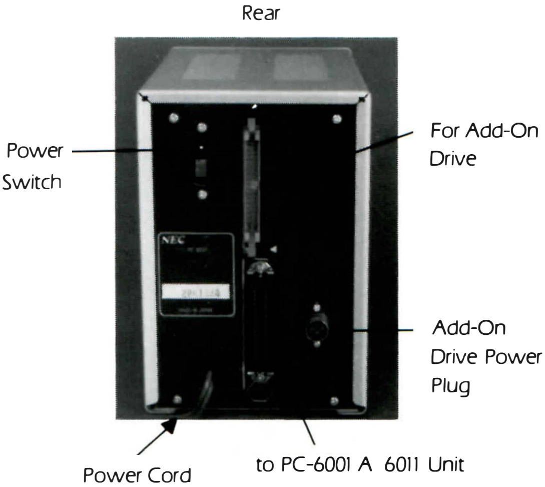
2. Make sure the PC-6011 A and PC-6001 A are on a level surface to insure proper connection.



Installing the Disk Drive PC-6031 A

The Disk Drive allows you to have access to more information at one time than you can have with cassette tape. You simply plug the unit into the rear of the Expansion Unit.

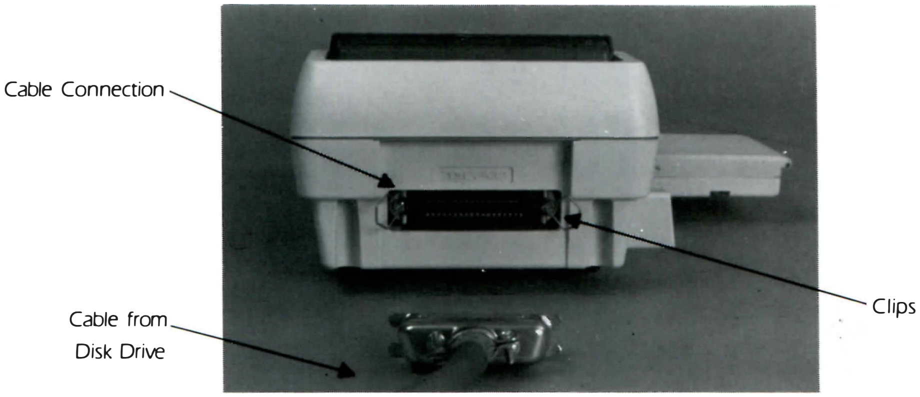

Front
Power Indicator
NEC Disk Unit PC-6031
Latch
Read/Write Indicator


Rear
For Add-On Drive
Power Switch
Add-On Drive Power Plug
Power Cord
to PC-6001 A 6011 Unit

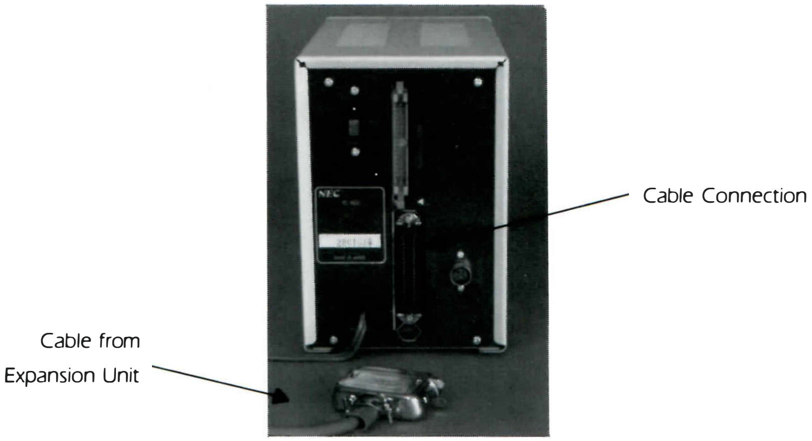
1. Place the disk drive to the right of the Expansion Unit. The Expansion Unit is required when using the PC-6031 A Disk Drive.

2 Plug the pin connector cord into the pin connector socket on the rear of the Expansion Unit.

Expansion Unit Rear View

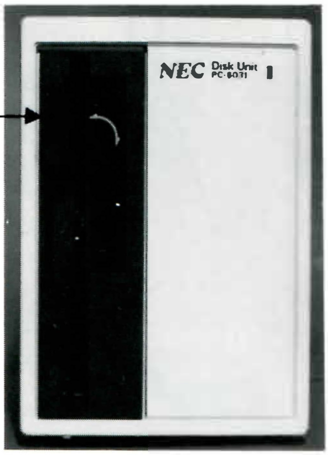

Cable Connection
Clips
Cable from Disk Drive

3. Plug the other end of the interface cable into the pin connection socket on the rear of the Disk Drive

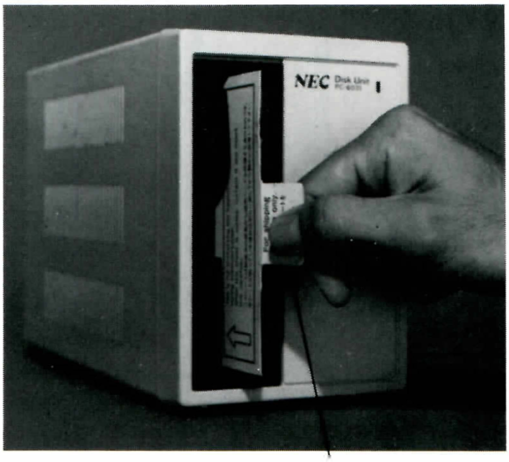

Cable Connection
Cable from Expansion Unit

4. Plug the power cord into an electrical outlet or power strip.

5. Remove the cardboard shipping protector by flipping open the Disk Drive latch and pulling the tab on the cardboard protector. Followthe arrow on the illustration below.


NEC Disk Unit PC-8031

Open


NEC Disk Unit

Pull tab straight out

Installing the Additional Disk Drives

The PC-6032 A is an additional Disk Drive Unit which can be used with your PC-6000 A Series Home Computer System.

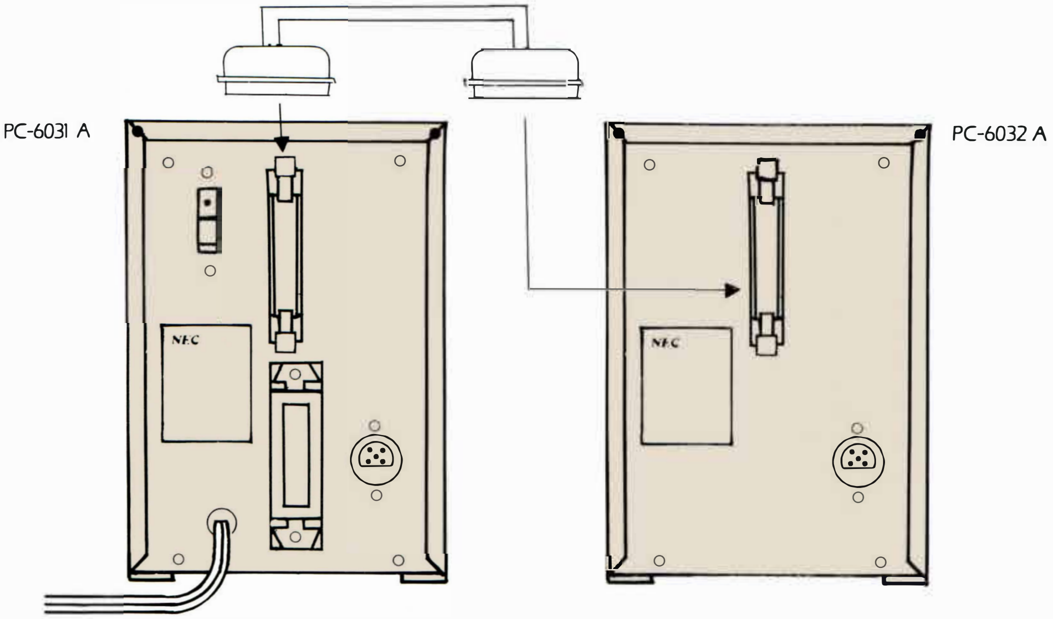
The PC-6032 A is connected to the PC-6031 A and requires the PC-6011 A Expansion Unit and the PCS-6001R Extended BASIC ROM cartridge to operate.

Expansion Power Connector
Disk Drive

NOTE: Turn off all power to all components before continuing.

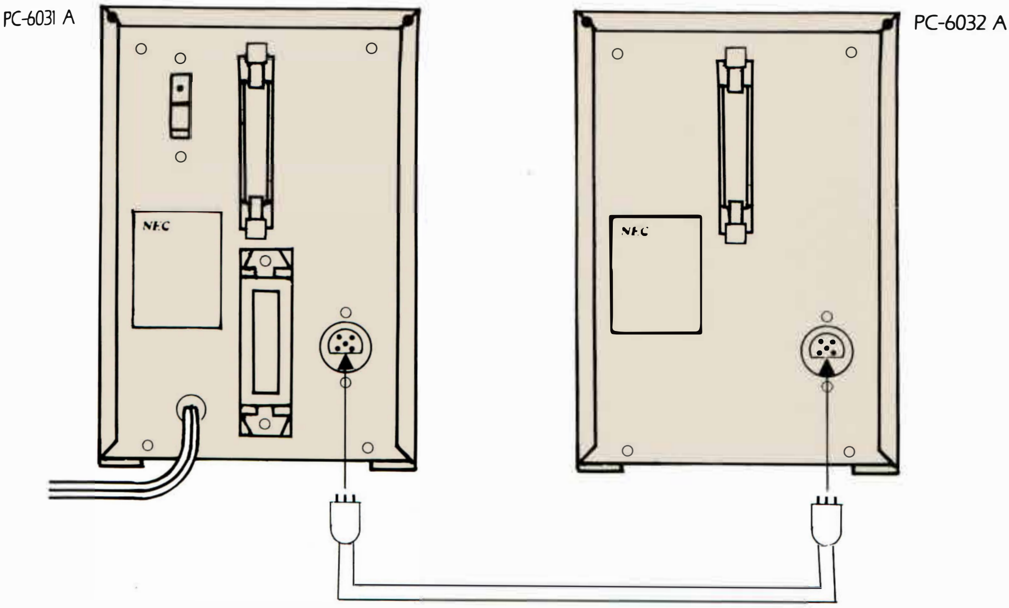
Installation steps:

1. Place the PC-6032 A to the right side of the PC-6031 A .
2. Connect one end of the disk cable into the back of the PC-6032 A . (Use the upper connector on the back of the disk drive units).



3. Connect the unattached end of the disk cable into the back of the PC-6031 A .

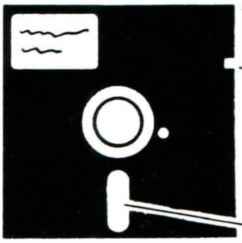
4. Connect one end of the Expansion Power Cord into the back of the PC-6032 A .

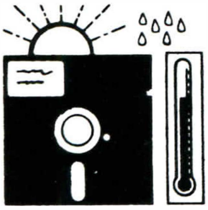

PC-6031 A
NEC
NEC
PC-6032 A

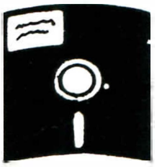
5. Connect the unattached end of the Expansion Power Cord into the back of the PC-6031 A .

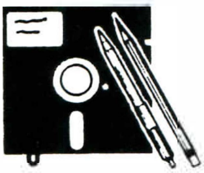
Maintenance Tips

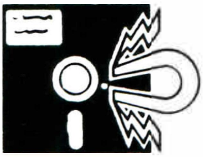
Be certain to always follow the instructions for care and handling of diskettes, as provided by the manufacturer. The diskettes that work with the PC-6031 A Disk Drive should always be handled with extreme care. **Always** follow these instructions for use, handling, and care of your diskettes.

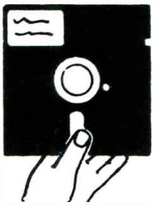






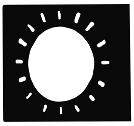






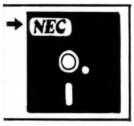
- The magnetic surface of the diskette is covered by a non-removable, black envelope. Damage to this envelope may result in damage to the diskette.
- The file protect notch. Use aluminum labels to cover this notch if you wish to prevent data from being entered onto this diskette. When protected, it is said to be "write-protected" which means that the computer can read data from the diskette but cannot write data to it.
- Exposed, magnetic surface of a diskette. Do not touch.
- Always store the diskette in its protective sleeve and stand them on edge to prevent damage to the magnetic surface.
- **Never** attempt to wash a diskette. Compressed air in a spray can (available from photographic stores) or a soft brush can be used to remove dust.
- **Never** store diskettes in direct sunlight or near excessive heat of any kind.
- **Never** bend a diskette. Handle them with care, especially when inserting into or removing from disk drives.
- **Never** open a disk drive gate when the red "IN USE" light in on, as you risk damaging the diskette.
- **Never** attach paper clips to the diskette.
- **Never** write on the diskette with hard surfaced pen (ball point). Always write directly onto the label with a felt-tip marker.
- **Never** expose the diskette to any magnetic source, such as electrical equipment or telephones, as you risk altering or erasing data from the diskette.

Disk Drive

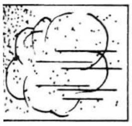


- Keep away from direct sunlight

- Handle gently, dropping the unit can cause damage to circuits.



- Use only the specified diskettes.



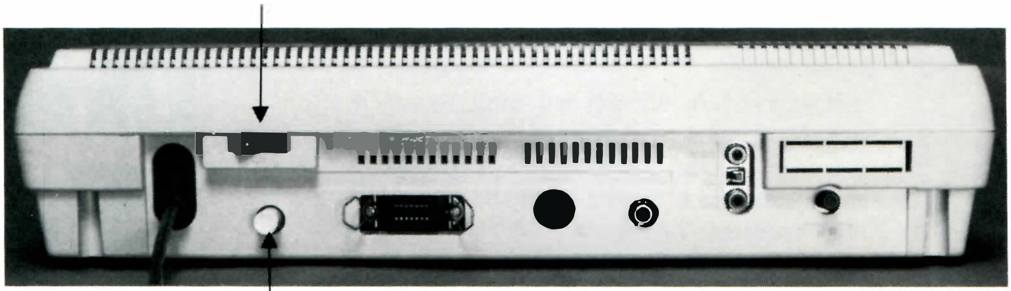
- Keep away from dust, paint and smoke.

Chapter 4:
Operating Your PC-6001 A

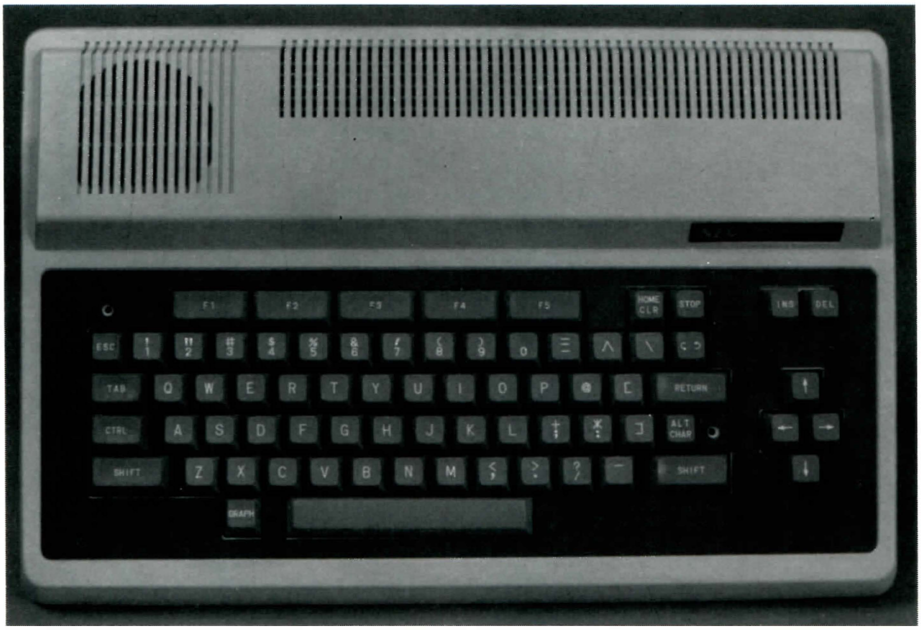
The PC-6000 A Series is an integrated computer system that can perform functions usually foun only in much larger systems. The two components required for basic operation are the console an the monitor. The keyboard is the central control of the PC-6001 A ; it provides the means by which yo communicate with the computer and its components. The monitor is where the computer commu nicates with you. It echoes what you type at the keyboard on the screen so you can make sure it correct. This is also where it prints responses to your commands.

1. In order to get started, turn the power on to all of the components except the PC-6021 Thermal Printer (if you have one). Next, turn the power on the console, then the Therma Printer. When you are finished using the system, turn off the Thermal Printer, then the console then all other components.

Rear of Console

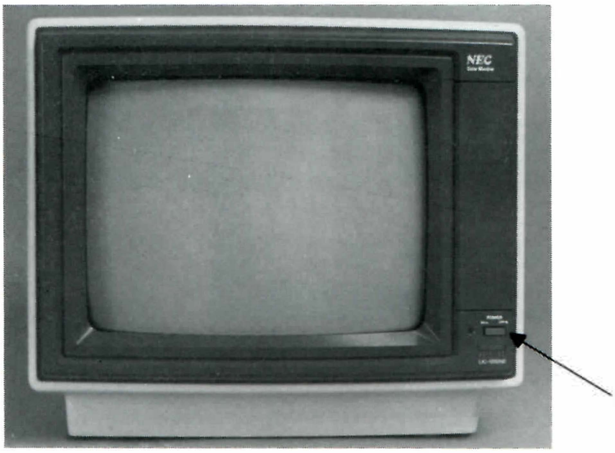

Power Switch
Reset Button

Front of Console

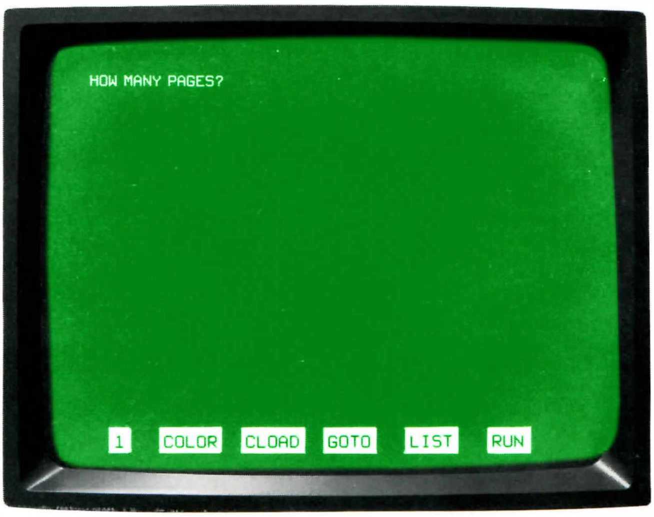

F1
F2
F3
F4
F5
HOME CLR
STOP
INS
DEL
ESC
TAB
CTRL
SHIFT
RETURN
ALT CHAR
SHIFT
GRAPH

2. Turn on the power to your monitor. At this time, make the proper adjustments for brightness, color, contrast, etc. (Refer to Chapter 11)

   If you are using a television, set the channel selection knob to channel 3. If this channel is a television station in your area, use channel 4. Be sure that the TV/game switch on the back of the TV is in the "Game" position. Fine tune your T.V. for the best picture.



3. The screen will display:

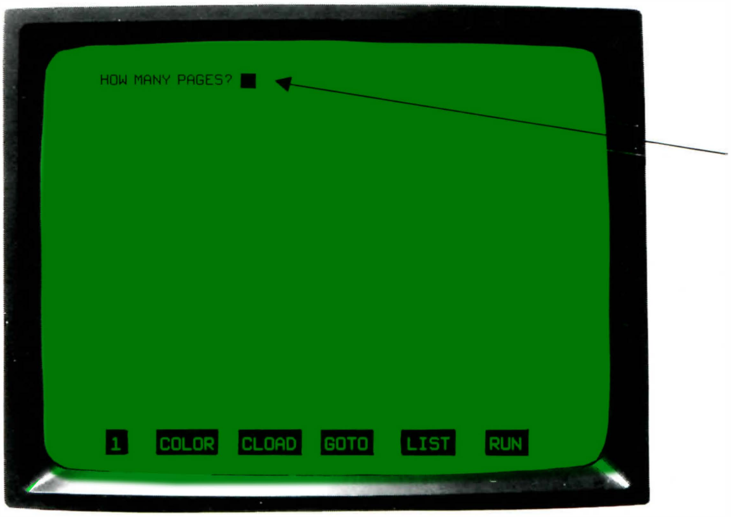


```
HOW MANY PAGES?
```

   If this message does not appear, touch the "Reset" button located on the rear of the PC-6001 A computer. If the message still does not appear, check the following:

   a. Is the cable connected correctly to the monitor or television. See pages 14 & 15.
   b. Are all power cords securely placed in the electrical outlet? See page 15.
   c. Make sure TV-GAME switch is set correctly. See page 15.
   d. Is the T.V. set to the proper channel & tuned in? See page 15.

Screen Definitions



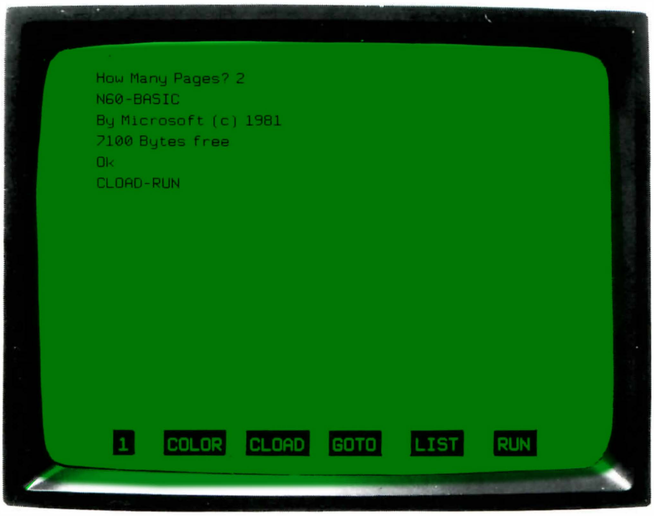
```
HOW MANY PAGES? ■
```

Cursor — this is where information that you type will be entered on the screen.

The question "HOW MANY PAGES?" that appears on the screen is asking for a number of pages (or screen image) to be used by the computer for the activity you are about to do. Refer to your NEC BASIC Reference Manual or Adventures with N-60 BASIC for more information on this prompt.

The screen page number varies depending on the application program. The booklet which is supplied with each program you purchase will tell you the correct number to enter. When loading programs that don't have the number of pages defined, just touch RETURN

1. In response to the question "HOW MANY PAGES?" you pressed the RETURN key. The following display will appear:

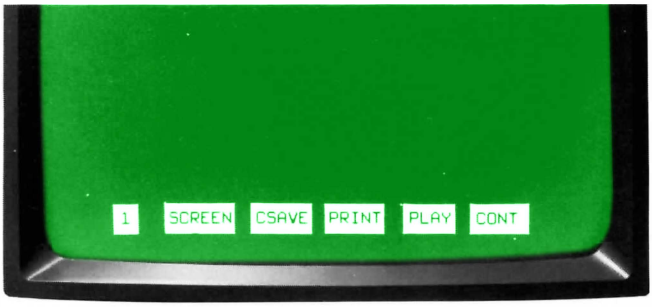


```
How Many Pages? 2
N60-BASIC
By Microsoft (c) 1981
7100 Bytes free
Ok
CLOAD-RUN
```

2. You are now ready to use your computer. You have just entered BASIC which is built into your PC-6001 A console!

   The functions located at the bottom of the screen parallel the function keys located on the top row of the keyboard (labeled F.1 through F.5). These function keys are a great timesaving way of entering often used character strings and BASIC statements by just pressing one key.

3. This screen actually offers you 10 different functions at this time. To see and use the second group of functions, hold down the SHIFT key:



You can engage the function for use on the computer by continuing to hold down the SHIFT key and at the same time touching the desired function key.

The functions are called F1 through F10 (where F10 = SHIFT + F5). Function keys are a timesaving way to enter commands or character strings that you use often. When you press one of the keys, its associated command appears on the screen just as if you had typed it on the keyboard. Refer to the N-60 BASIC Reference Guide for detailed explanations of these commands.

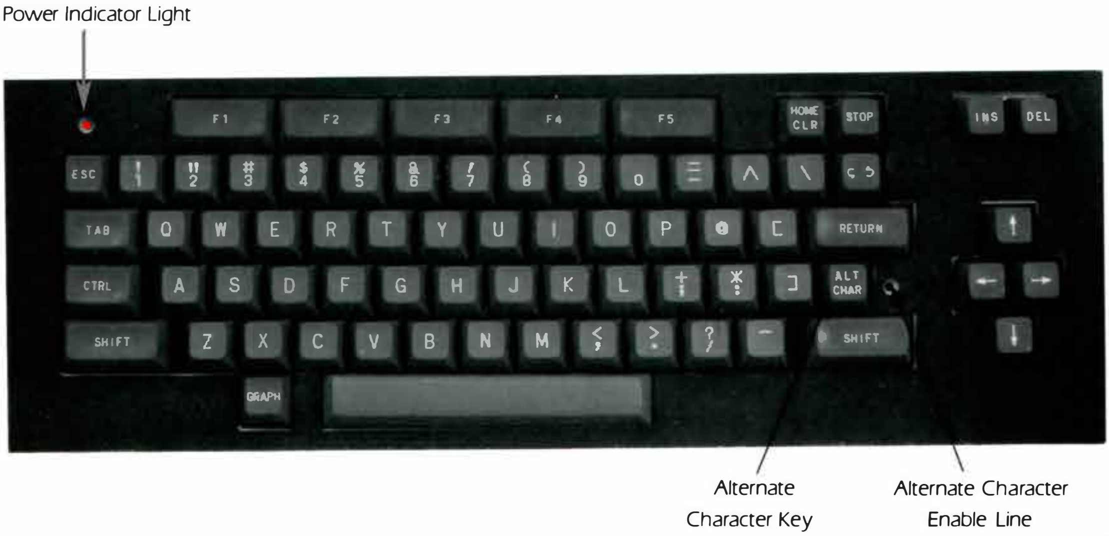
F1	= COLOR	allows you to choose a color.
F2	= CLOAD	allows you to load a program from cassette tape.
F3	= GOTO	allows you to move within a program to a designated line of that program.
F4	= LIST	allows you to list the contents of a program.
F5	= RUN	allows you to run a program.
F6	= SCREEN	allows you better control of the screen.
F7	= CSAVE	allows you to save a program to the Data Recorder unit.
F8	= PRINT	allows you to print either a program or data.
F9	= PLAY	allows you to program and play music.
F10	= CONT	allows you to divide a program and continue a program from where it stopped.

When the PC-6001 A is first turned on, it loads with the function keys automatically, you can load or define them yourself, for your own 'shorthand', with the PC-6001 A !

Keyboard Definitions

The PC-6001 A keyboard lets you enter letters (both upper and lower case), numbers and symbols for programming, graphic symbols and special characters.

Notice that the illustration below shows the keys that are traditionally used on a normal typewriter and a number of other keys that are not quite so familiar.



CHARACTER KEYS - Use the character keys in exactly the same way as on a standard typewriter. In order to type a capital letter, you type the letter while holding down the SHIFT key - the same as a typewriter.

NUMBER/SYMBOL KEYS - Use the number keys in exactly the same way as on a standard typewriter. In order to type the symbol that appears on the top half of each number key, hold down the SHIFT key at the same time you type the symbol.

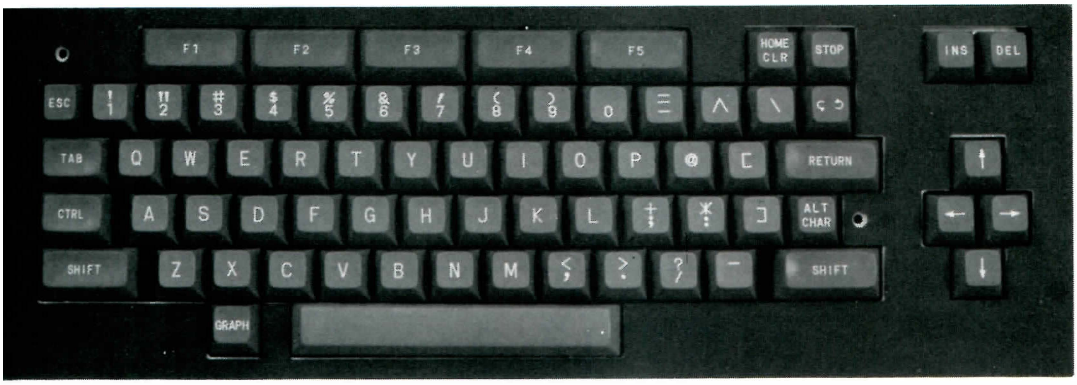
RETURN - The RETURN key is used to enter data into the computer. It is the way you tell the PC-6000(A) you are finished typing a line or entering a command. Each time you enter a command from the keyboard, you will follow it by pressing the RETURN key.

SPACE BAR - The SPACE BAR is used to put a space between words and move the cursor across the screen from left to right.

HOME CLR - When you press this key, the PC-6001 A clears its screen and returns the cursor to the upper left corner of the screen. This is called the HOME position. The cursor can be moved to the HOME position without clearing the screen by holding down the SHIFT key while you press the HOME/CLR key. Refer to your Reference Manual or Adventures with N-60 BASIC for more information.

Keys for Speed and Efficiency

The PC-6001 A keyboard offers some keys that make it far more than an ordinary typewriter.


F1 F2 F3 F4 F5 HOME CLR STOP INS DEL
ESC ! 1 " 2 # 3 $ 4 % 5 & 6 ' 7 (8) 9 0 = ^ \
TAB Q W E R T Y U I O P @ [RETURN
CTRL A S D F G H J K L + ; * :] ALT CHAR
SHIFT Z X C V B N M < , > . ? / _ SHIFT
GRAPH

CURSOR CONTROL KEYS - The arrow keys are used to control cursor movement.

↑ moves the cursor up

↓ moves the cursor down

→ moves the cursor left

← moves the cursor right

By using these keys, you can place the cursor (the blinking light) at any position you'd like. This makes adding and deleting information or performing other operations much easier.

INS - The INSERT key allows you to insert letters, numbers, or symbols into a line of text or numbers where the cursor is located. Once you are in the "insert" mode of operation, you can continue to insert new information. Touch the RETURN or CURSOR CONTROL keys to leave the insert mode.

DEL - The DELETE key allows you to delete information. Touch this key once to delete the character that is immediately to the left of the cursor. You can continue to touch this key as many times as is required to delete the information you no longer need. Press the RETURN key or a CURSOR CONTROL key to leave the delete mode.

STOP - The STOP key causes the cursor to be positioned at the beginning of the next line. This key is also used to stop program listings and executions.

Example: While writing a program, you accidentally typed "10 prannt Hello." What you meant to enter was "10 print Hello." By using these special keys, your mistakes can be quickly and easily corrected. (■ represents the cursor.)

10 prannt Hello■

— move the cursor with ←

10 pr a nnt Hello

— input I to change the "a" to "i"

10 pri n n t Hello

— move the cursor with →

10 prin n t Hello

— delete the extra "n" before the cursor by using DEL

10 pri n t Hello

— move the cursor with →

10 print H ello

— insert quotation marks here using INS. Press INS, then type SHIFT "2.

Then touch the RETURN or a CURSOR CONTROL key to leave the insert mode.

10 print " Hello

— move the cursor with →

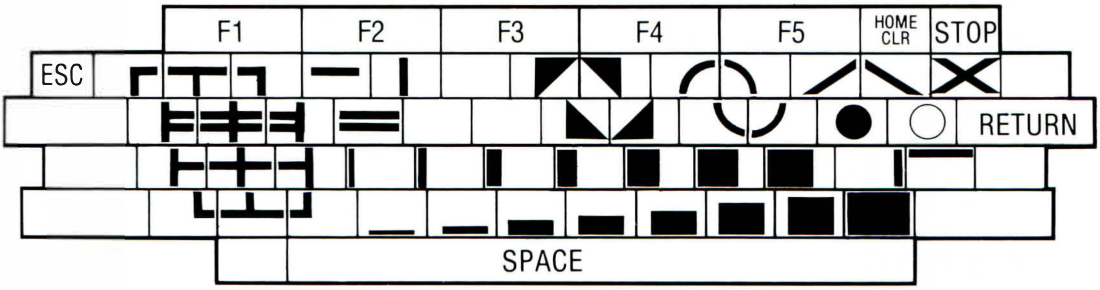
10 print "Hello■

— type SHIFT "2 to insert last quotation mark. Your program line now looks like this:

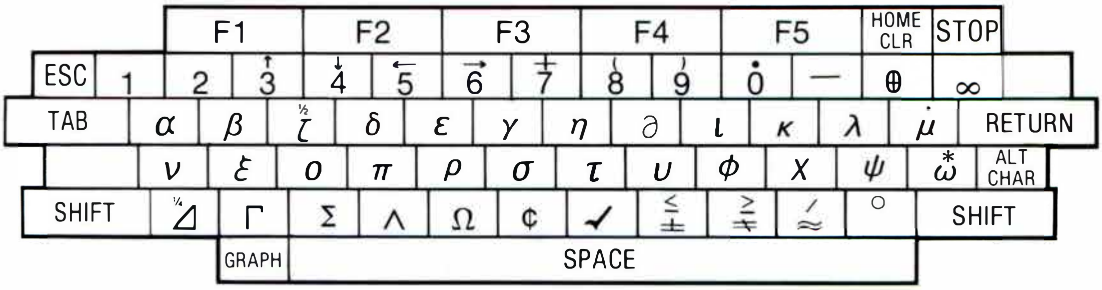
10 print "Hello"

Special Keys

GRAPH - The GRAPH key activates the graphic mode of operation. Touch this key while in the alphabetic display mode and graphic symbols will be displayed as seen in the following chart. Refer to the specification section of this book for a breakdown of these keys.


F1
F2
F3
F4
F5
HOME CLR
STOP
ESC
RETURN
SPACE

ALT CHAR - The ALTERNATE CHARACTER SET allows you to type the Greek characters and math symbols directly from the keyboard. An indicator lamp directly to the right of this key will let you know when this mode is in operation. Refer to the back of this book for a breakdown of these keys.

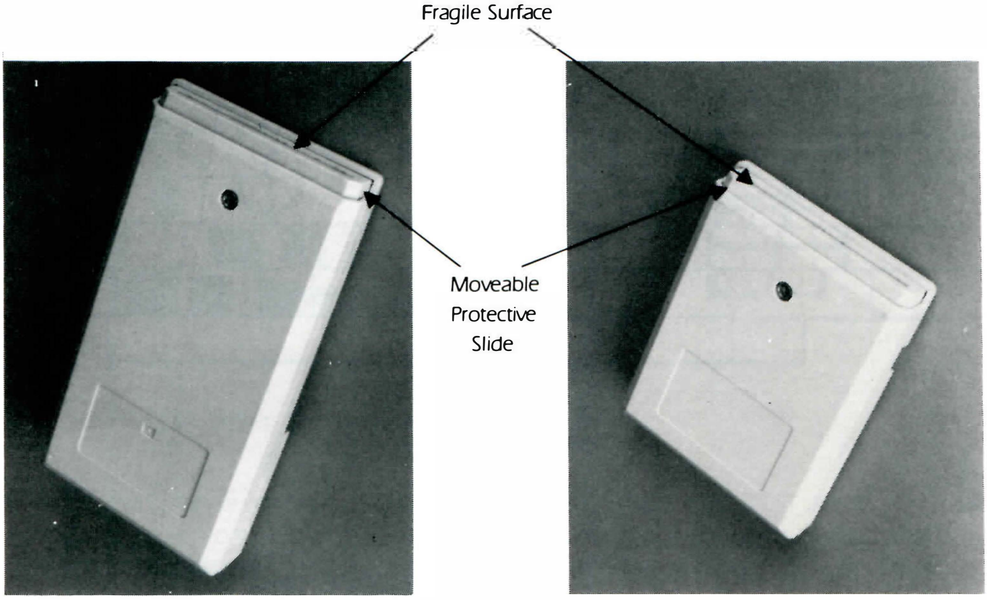

F1
F2
F3
F4
F5
HOME CLR
STOP
ESC 1 2 ↑3 ↓4 ←5 →6 7 8 9 0 — θ ∞
TAB α β ½ζ δ ε γ η ∂ ι κ λ μ RETURN
ν ξ ο π ρ σ τ υ φ χ ψ ω ALT CHAR
SHIFT ¼Δ Γ Σ Λ Ω ¢ ✓ ≤ ≥ ≈ ° SHIFT
GRAPH
SPACE

ESC - The ESCAPE key is a function key that allows you to pause program listings and program execution.

CTRL - The CONTROL key is used in certain computer programs (almost always in conjunction with another key) to issue a number of commands. Refer to the BASIC Reference Guide for more information on the CONTROL key.

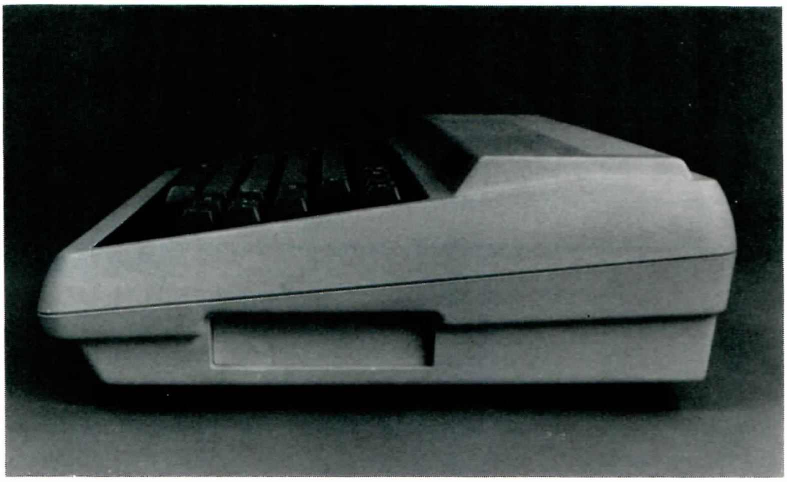
How to Use the ROM and RAM Cartridges

The PC-6000 A Series can use easy to load cartridges that just pop into the PC-6001 A console or the PC-6011 A Expansion Unit. For example, the Touch Panel Cartridge made by NEC Home Electronics for the PC-6000 A. Check with your authorized NEC Home Electronics dealer for other available cartridges.



Be very careful when handling the ROM and RAM cartridges. The end that is inserted into the PC-6001(A) contains very complicated electronic circuitry. Be careful not to drop or bend the cartridge.

1. Insert the cartridge all the way into the cartridge insertion port located on the right side of the PC-6001(A) computer. When inserting a cartridge, turn off your PC-6001 A console. Make sure your cartridge is inserted properly, and turn on your console.



2. The cartridge, when pushed into the port, will cause the PC-6001 A to temporarily pause and then re-load. The power goes off and then on again.

NOTE: If your program does not appear on the screen, press the reset button located on the back of your PC-6001 A.

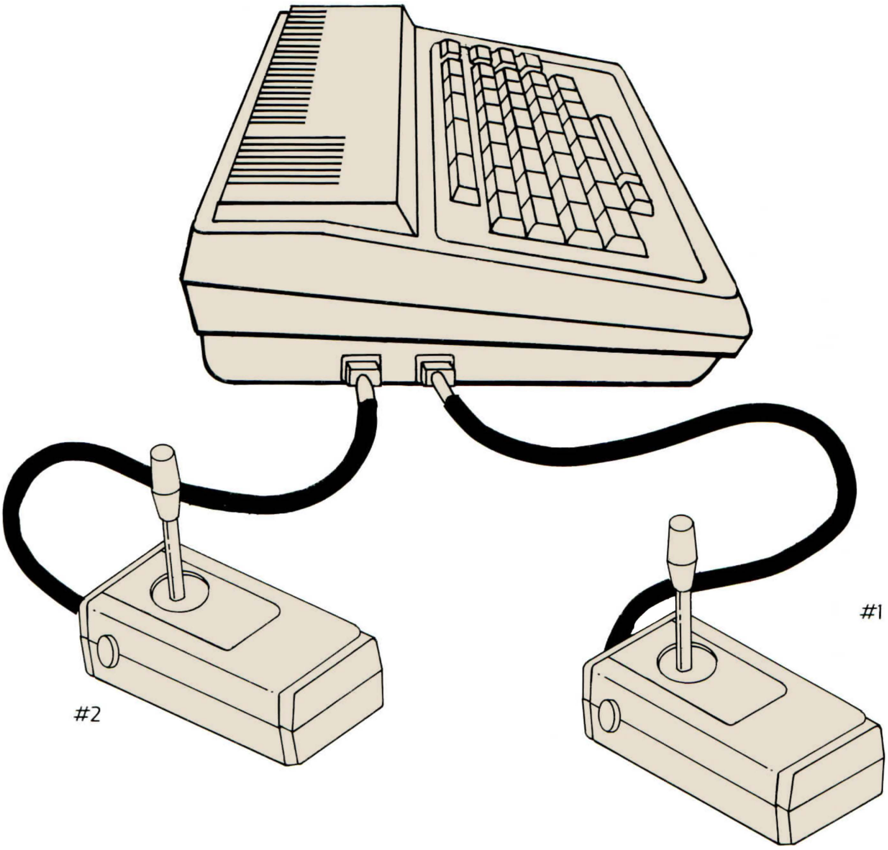
Loading a Program from Tape or Disk

To load a program from cassette tape, refer to Chapter 5

To load a program from disk, refer to Chapter 9.

Using Joysticks

NEC Joysticks are a great benefit for your PC-6000 A System, particularly for "action" games. The PC-6000 A uses NEC Home Electronics joysticks which easily plug into the joystick ports on the left side of the keyboard



SECTION III

The Sophisticated Computer System

Section III of this User's Guide examines the many features that you get with your PC-6000 A Series Computer. In this section we'll take a look at some of the special features by examining each of the components individually. We'll show how each component operates, and in turn how each works with the other components to give you maximum results.

Chapters

5. The Cassette Recorder (PC-6082A)
6. The Thermal Printer (PC-6021A)
7. The Touch Panel (PC-6051)
8. The Expansion Unit (PC-6011A)
9. The Disk Drive (PC-6031A)
10. The RS-232C Interface (PC-6061A)
11. The Monitor (JC-1212/JB-1260/JB-1201/JB-902)
12. The Dot Matrix Printer (PC-8023A-C)

Inexpensive High Technology

The NEC Home Electronics PC-6000 A Personal Computer System is so much more than just a video game. No matter whether you have the basic unit or a fully equipped system with all of the components the PC-6000 A is a powerful workhorse of a computer. The PC-6000 A offers such unique features as high resolution color graphics and a programmable music editor. When fully expanded, the PC-6000 A computer memory can handle 32,000 bytes or characters (32K ROM and 32K RAM)

The features offered here would be quite incredible even for large computers. And yet many of these features can't be found on other computer systems at any price. The PC-6000 A Series features

High resolution **color graphics.** A choice of three different monitors. Add our Touch Panel and you can create original electronic "masterpieces" The Touch Panel can keep you on top of business and school activities by designing your own unique bar charts and graphs And when you want to let the Picasso in you out, the Touch Panel becomes your electronic canvas.

2. **Music.** Not just canned music that plays cute little single-toned melodies, but real high quality musical sound. The PC-6000 A includes a recently developed sound chip which allows you to be the composer of classics. Through the use of the Music Editor, your typewriter keyboard becomes a music synthesizer which can play and record the standards or your originals. The built-in sound generator has three voices available. Each voice has a fantastic eight octave range with the ability to control volume, note length, rests, tempo, envelope cycle and shape!

3. Intelligent, easy to access **data storage** with the PC-6000 A Disk Operating System. Using the disk unit and transportable magnetic diskettes lets you turn your computer into an incredibly quick and efficient data handler. Each diskette can easily handle over 140,000 (140K) characters of information . The diskettes are easy to load and can be used over and over again.

4. The **extended language** available to you with the Extended BASIC cartridges lets you have total control of your computer. By using the easy to learn programming language you will probably get your PC-6000 A computer to do things that even larger systems cannot do, such as drawing a circle. The optional language gives you the ability to use and control files and disks for creating intricate programs

5. With appropriate Software you can **print** those **graphic images** that you created with your Touch Panel. And you can print characters, numbers, words, reports, books . . . Just about any image you can produce on our high resolution monitor can be duplicated on paper by using the PC-6021 A Printer Unit.

6. Probably not last and certainly not least of the PC-6000 A features is its ability to talk to other computers. The PC-6000 A is compatible with the multi-purpose serial interface - the optional RS-232C. Using this interface allows your computer to **communicate** with practically any other computer. Now you will be able to "tap in" to information systems or timesharing services far beyond your immediate geographic area.

The following chapters will supply you with detailed information on the use, care and technical operation of the different pieces of equipment in the NEC PC-6000 A Series Personal Home Computer.

Chapter 5:
The Data Recorder (PC-6082 A)

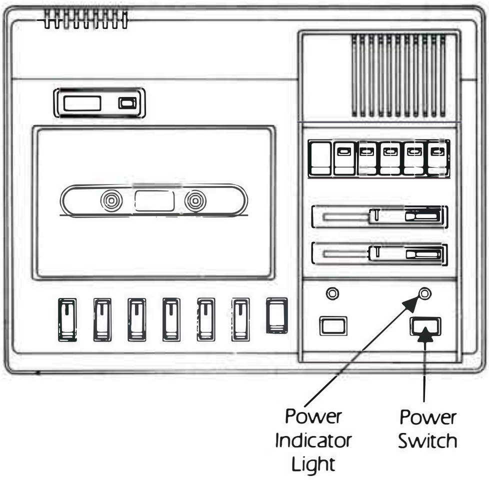
The Data Recorder looks much the same as a standard cassette tape player but offers features not found on a standard unit. It is specially designed for use with the PC-6000 A Series. Its highly sensitive monitor and load level adjustment controls allow for safe and consistent writing and reading of microcomputer programs and data to and from cassette.

How to Use the Data Recorder

The NEC Home Electronics Data Recorder is an easy to operate filing system. It is used to store information from the computer and then re-enter it at a later time. By using the Data Recorder your computer can "read" programs that are stored on cassette tape. This means that the computer loads a program into its memory from the cassette tape, making it available for your use.

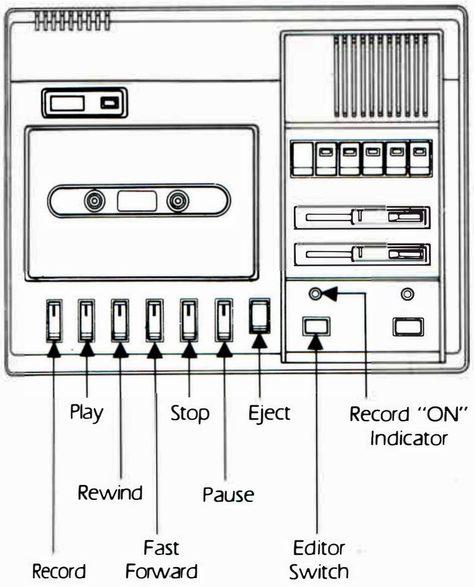
The Data Recorder is also used to "write" information from the computer to the cassette tape. This means that once you've completed your work with the computer, you can safely store that information on cassette tape for use again and again.

Let's take a closer look at the Data Recorder:



Power Switch - To turn "on" the power to the data recorder, press the green switch. To turn the power "off" press the switch again.

Power "On" Indicator - This green light indicates that the power to the data recorder is on.



Record - Press this button (and at the same time press the Play button) to cause the Data Recorder to be in the "record" mode.

Play - Press this button to cause the Data Recorder to play previously recorded programs or data.

Rewind - Press this button to cause the tape to rapidly move in a reverse direction.

Fast Forward - Press this button to cause the tape to rapidly move in a forward direction. It is also used along with the Program Search buttons to retrieve a specific program.

Stop - Press this button to cause the Data Recorder to stop any mode of operation.

Pause - Press this button to cause the Data Recorder to temporarily pause while in the "play" mode of operation. Press the button again to return to play mode.

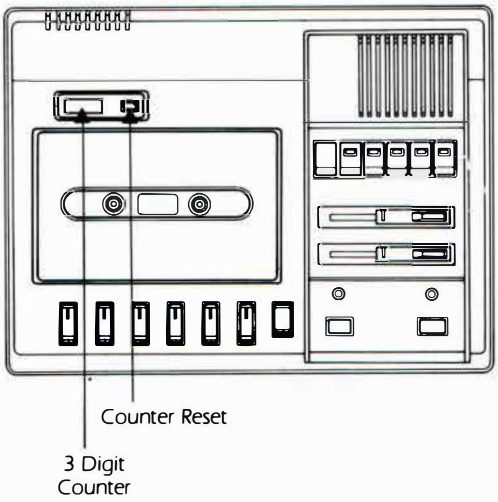
Eject - Press this button to open the cassette tape housing for insertion or removal of a cassette tape.

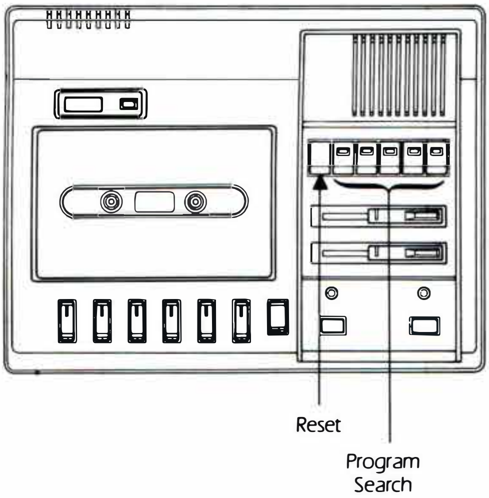
Editor Switch - Used to edit or erase portions of a tape that you no longer wish to keep. The Editor also inserts blank spaces between programs so the NEC Search and Play System can easily find your desired program.

Recorder "On" Indicator - This red light indicates that the Data Recorder is in the "record" mode of operation.

Counter - A 3-digit counter is used to mark locations of specific programs and data for future reference.

Counter Reset - Press this button to reset the 3-digit counter to 000.



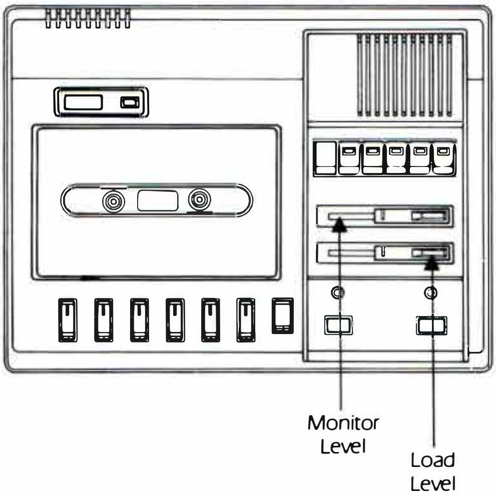

Reset
Program Search

Program Search - Five buttons designed to help you search for specific programs on a cassette tape. These buttons are used along with the Fast Forward button to rapidly access individual programs.

Reset - This button resets the program search function.

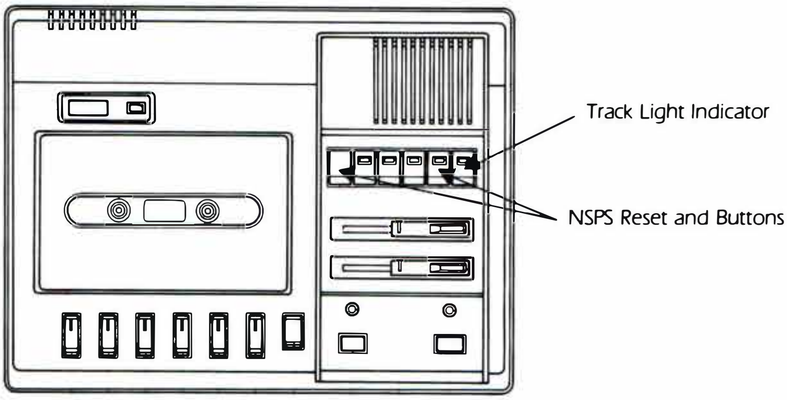
Monitor Level - This slide bar is used to get the proper level of volume when the Data Recorder is in use.

Load Level - This slide bar is used to get the proper transfer level for "reading" the programs and data from the Data Recorder to the computer. Normally the Load Level should be adjusted to position 5.


Monitor Level
Load Level

The NSPS Feature

The NEC Search and Play System (NSPS) makes loading a tape even easier than just described. There are many times where you have five or six programs stored on one side of a tape. To find the program you want easily, the NSPS can be used.


Track Light Indicator
NSPS Reset and Buttons

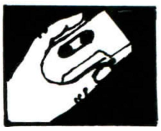
Using NSPS to CLOAD a program

1. Insert the desired tape into the Data Recorder. Make sure the tape is completely rewound.
2. Press the PLAY button on the front of the Data Recorder.
3. Press the NSPS Reset button, then select the desired program search number 1 through 5. If you select 1 you will load the program that is second on the tape, selecting 3 will load the fourth program on the tape, and so on.
4. Type CLOAD into the keyboard then press RETURN.
5. Immediately press the Fast Forward Button and the NSPS will take over.

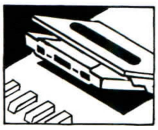
Care and Use of Cassette Tapes

We recommend that you use the best quality high-bias tape available. Often you will be storing valuable information on cassette tapes and we're sure you wouldn't want to lose that information due to the use of an inferior product

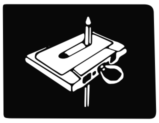
Follow manufacturers recommendations for care, temperature, and storage of cassette tapes. A few additional recommendations:



1. **Never** touch the magnetic surface of the tape. **Always** handle the tape by the plastic case in which it is enclosed.



2 **Always** insert the tape into the Data Recorder with the magnetic surface facing the front of the unit. Gently place the tape into the Cassette Tape Housing. **Never** force it in.



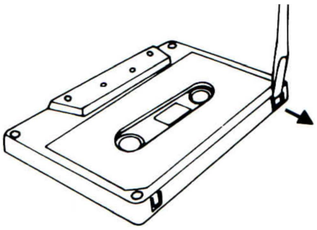
3. The tape should be tightly wound in the cassette package at all times. If it should become unraveled or loosened, gently place a pencil into the play reel (not the take-up reel) and slowly tighten the tape by turning the pencil clockwise.

How to Write Protect a Cassette Tape

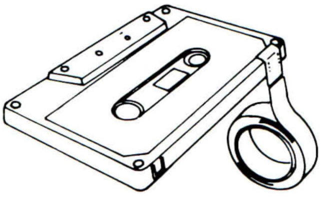
AUDIO TAPES

Audio tapes are standard cassettes used with normal stereo systems. If this is the type you are using with your Data Recorder, and you'd like to protect either a program or data tape from having new information written on it you should remove the punch tabs from the back of the tape, as illustrated below Be sure to carefully remove them without cracking the case of the tape

When the cassette tape is held flat, the write-protect tab for the side facing up will always be on the right. The illustration shows the tab for Side A is being removed to write-protect that side of the tape.



Should you later decide that you'd like new information written to a tape that has been write protected, you simply cover the write-protect tab area with a strong piece of cellophane tape. The cassette is again functional for either input or output.



DIGITAL TAPES

Digital tapes, tapes made especially for computers, have built in protect tabs that slide or flip to write protect the tape. Refer to the manufacturer's instructions to find the proper method of write protecting the tape

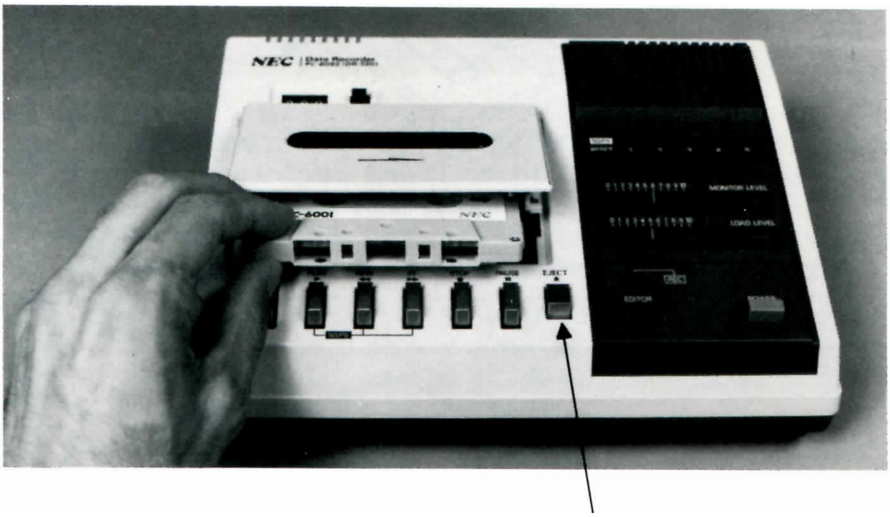
Program Loading and Data Storage

Cassette tapes can be "read from" and "written to". When the computer accesses a cassette tape, the computer essentially "borrows" that program from the tape. It doesn't actually remove the program, rather it reads the information for use in the computer memory

Insert the Cassette Tape

1. Press the Eject button to open the Cassette Tape Housing as illustrated above.

2. Insert the demonstration cassette tape that came with the PC-6001 A console into the Cassette Tape Housing with the magnetic tape facing the front of the Data Recorder. Check the label on the tape to be sure you are inserting the side of the tape that has the program you want to use



Eject Button

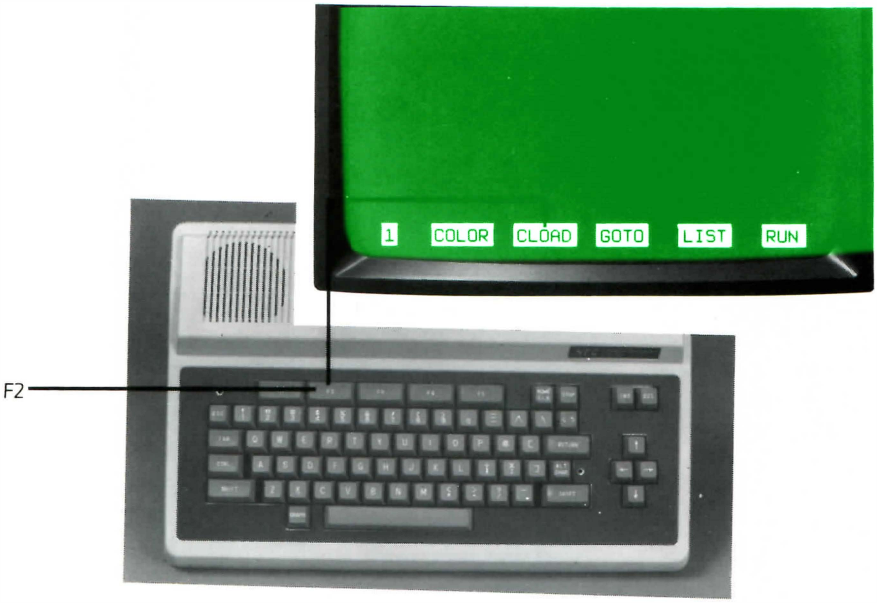
3. Press the Cassette Tape Housing back into a closed position.

Load a Tape

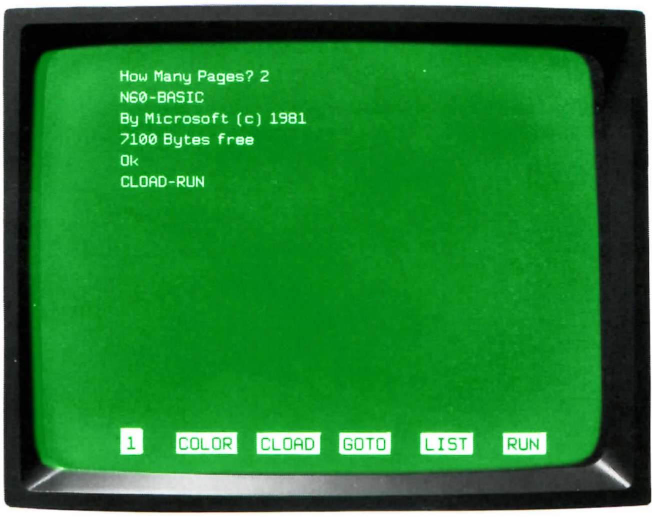
1. Check the Load Level Control (normally it should be a position 5) and be sure that the cassette tape is completely rewound to the left spindle.

2. Press the Play button on the Data Recorder.

3. Touch F2 function key on the PC-6001 A computer keyboard. 'CLOAD' will be displayed on the screen.



4. Enter the name of the program that you want to use and then press the RETURN key on the PC-6001 A keyboard.



```
How Many Pages? 2
N60-BASIC
By Microsoft (c) 1981
7100 Bytes free
Ok
CLOAD-RUN
```

* If the tape was loaded properly and the CLOAD command entered correctly, the PC-6001 A will make a load beep then a clicking sound and the Data Recorder will start rotation. The PC-6001 A will then search for the designated program on the cassette tape.

* When the designated program is found, the program name will be displayed on the screen. A blinking asterisk (*) will appear in the upper right hand corner of the screen until the entire program is completely transferred to the PC-6001 A . "OK", which is your computer's way of indicating its readiness to accept your commands, is displayed on the screen when the program has been completely transferred to the PC-6001 A . You can now run the program on the PC-6001 A .

5. To run the program touch the F5 key or type in RUN and press the RETURN key.

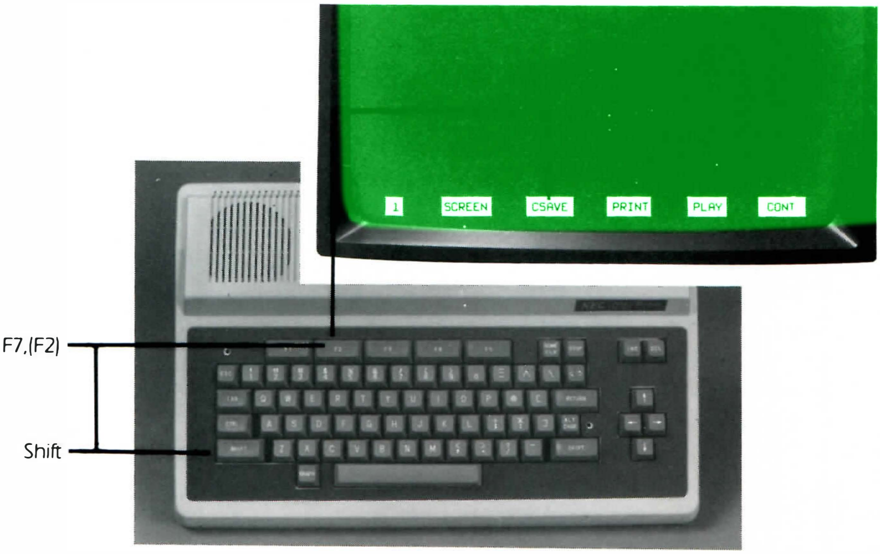
How to Save a Program

To store a program you must have available a cassette tape with enough storage space to copy the entire contents of the program. We recommend using C-30 or greater tape length so that you can store more data on the tape.

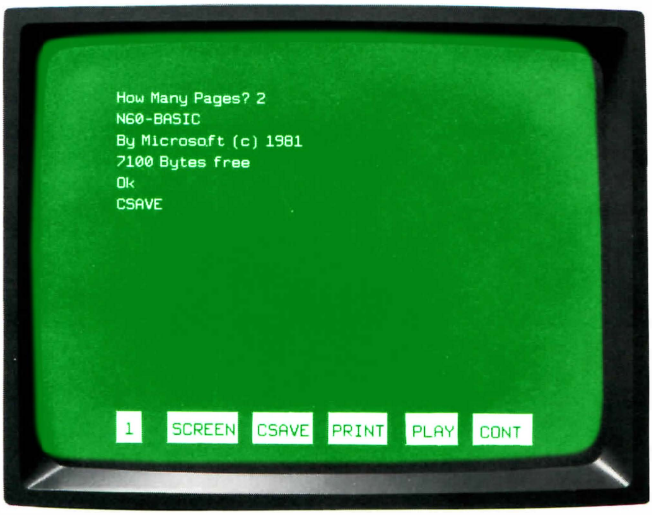
1. Be sure that the power is "ON" to the Data Recorder. Place the tape in the Cassette Tape Housing with the side you wish to record to facing right-side up.

2. Press the "Record" and "Play" buttons at the same time to put the Data Recorder in a "Record" mode of operation.

3. Hold down the SHIFT key and at the same time touch the F7 function key on the PC-6001 A computer keyboard. 'CSAVE' will be displayed on the screen



4. Type in a program name (6 characters maximum). The name should be easy to remember because you will want to access this program later. It should describe the program so that you will not confuse this program with others that you have already saved.

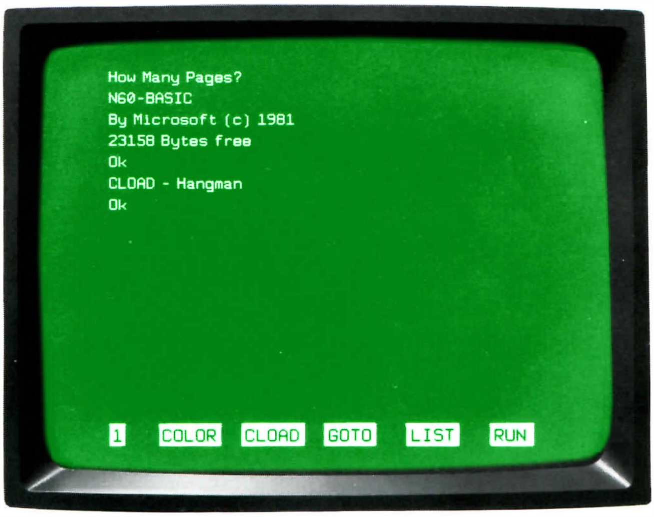


```
How Many Pages? 2
N60-BASIC
By Microsoft (c) 1981
7100 Bytes free
Ok
CSAVE
```

* The PC – 6001 A will automatically start the Data Recorder rotation. When the program recording is completed "OK" will be displayed on the screen. The Data Recorder will automatically stop.

5. You might find it useful to note the number that appears on the tape counter at the beginning of the tape CSAVE copy. This number can be written on the tape label along with the program name for easy reference.

6. To check that the program was correctly recorded onto the tape, use the procedures for loading a tape. This time when CLOAD? appears on the screen, type the name you've given this program and touch RETURN



```
How Many Pages?
N60-BASIC
By Microsoft (c) 1981
23158 Bytes free
Ok
CLOAD - Hangman
Ok
```

* The PC-6001 A will automatically compare the program that has just been recorded with its duplicate which is still in the temporary memory of the PC-6001 A. Once the comparison is successfully completed, "OK" will be displayed on the screen.

7. If it's an important program that you have just saved, we suggest that you save a second copy on another cassette tape. This "back up" copy can then be used in the event of some malfunctioning of the original tape.

Demonstration Tape

Your PC-6001 A system comes equipped with an NEC Home Electronics demonstration tape. This ape contains programs that show you the abilities of your PC-6001 A system and entertain you at ne same time.

To load the programs from this tape, follow the instructions for loading a tape on the previous page. When loading side 1 of the tape, use the program name "color". In order to set the color tone correctly on your monitor, load the **COLOR** program from the demonstration tape supplied with the PC-6001 A and allow it to appear on the screen. The color sequence on the screen is green, blue, red and vhite (from left to right). Adjust the monitor so that these colors are in the right sequence After "color" completes, press the RETURN key and it automatically leads you through the rest of the programs on this side of the tape. When the last program on the cassette is finished, the tape starts over at the beginning. To stop the program, just press the STOP key.

You can load the programs individually by following the program load instructions on the preceding pages

The program names are; marche, color, Intro 1, Intro 2, Intro 3, PC6001, sonata, rag, toria, sugar and sound These programs show you the high quality graphic and sound capabilities of your computer.

An additional program is substr. Substr (abbreviation for sub strike) is an action game where you try to sink enemy ships with torpedoes from your submarine. We highly recommend that you load and run this program to acquaint you with your computer and to see just what amazing things your PC-6000 A can do.

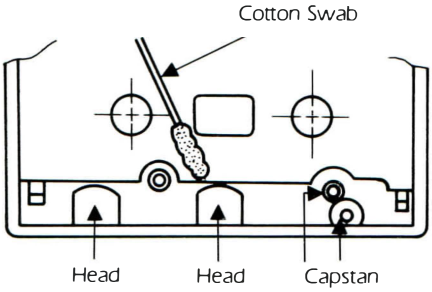
Maintenance Tips for the Data Recorder

The Data Recorder requires a minimum amount of maintenance. However, for optimum performance, we recommend that you periodically clean the tape heads.

The simplest method for cleaning the tape heads is to use a head cleaning tape Directions for using these tapes are supplied with the tape. These are available through any audio component supply house or store where stereos are sold. However, if you do not have a head cleaning tape follow the instructions below:

1. Open the tape door using the Eject button.

2. Place a cotton swab saturated with isopropyl alcohol (common rubbing alcohol) against the heads and capstan and gently clean the surface



3. Use a second cotton swab to gently dry the surfaces.

4. Wait 5 minutes after drying to insure all the alcohol has evaporated before inserting a tape.

Troubleshooting

If the Data Recorder does not operate the way it is supposed to, check the following items.

☐ Is there power to the unit. See page 38.

☐ Are the cables correctly inserted to the Data Recorder? The console? See page 16

☐ Are the correct buttons pressed on the Data Recorder for the desired process? See page 39.

☐ Is the tape Write Protected? See page 43

☐ Is the tape itself defective? Have you tried another? See page 42.

After all of the above items have been checked, and your PC-6082 A Data Recorder still does not perform properly, contact your Authorized NEC Home Electronics Dealer, or contact NEC Home Electronics at the following address:

1401 Estes Avenue
Elk Grove Village, Illinois 60007

Your PC-6000 A is a well-built, reliable system, however, as with any piece of electronic equipment, there may be times when repairs are necessary. NEC Home Electronics provides an Extended Warranty for times such as this at a low annual fee. For information on ordering an Extended Warranty for your system, refer to the Extended Warranty Request card that came with your PC-6001 A User's Guide and component pamphlets

Chapter 6:
The Thermal Printer

The PC-6021 A Printer adds a new dimension to the PC-6001 A computer. With its extremely quiet operation, you hardly know it's working Now printouts of your programs and graphics can be saved and used. Mathematics, graphic illustrations, worksheets and hundreds of other items can be quickly printed on the thermal printer. Now you can make exact copies from the screen to the 40 character wide printer with just one command instead of writing a program to do it.

For the programmer who is creating sophisticated programs, the printer will prove invaluable. Program code, sample screen copies and many other printing functions will greatly aid in the speed and accuracy of program creation.

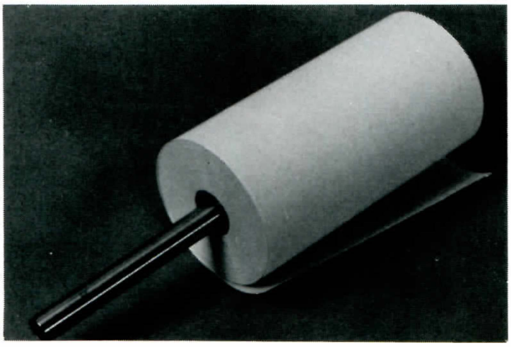
With the Thermal Printer attached, you can get printed copies of those special reports and graphics or listings of your program code. You will, of course, still want to save your programs and data on cassette tape or floppy disk but the printer can become your working tool to let you track the progress of any of your computer related activities.

Using the Thermal Printer

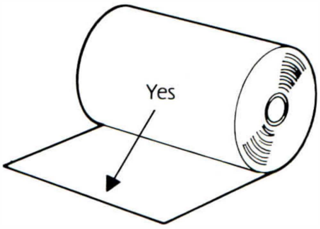
The Thermal Printer is a simple device to operate. It's very much like using the printer on most calculators.

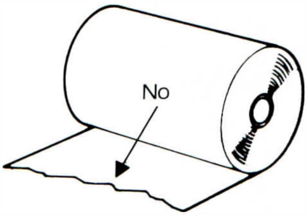
Loading Paper

1. Insert the paper shaft into the center of the roll of paper. For additional paper, contact your authorized NEC Home Electronics dealer.

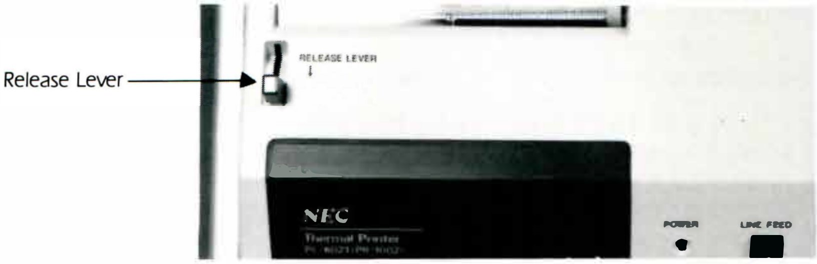


2. Cut the end of the paper with a pair of scissors so that it is even.

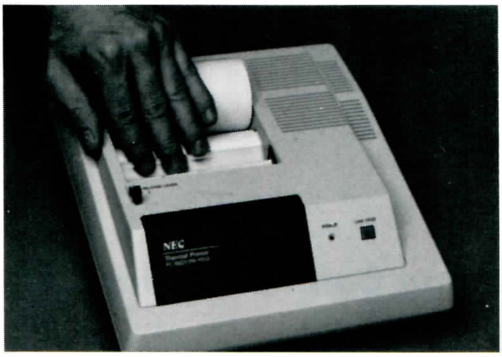




3. Set the paper roll into the printer and pull the paper release lever forward.



4. Feed the paper under the platen (the round typewriter-like roller) so that it comes around and through. The paper will then head toward the rear of the printer.



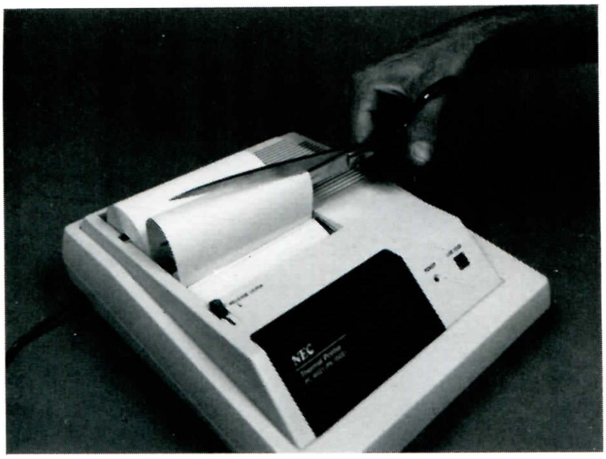
**** Make sure the shiny side of the paper faces the plastic window! ****

5. Push the paper release lever back to its original position.

6. Press the Line Feed button until paper appears above plastic window.

Removing Paper

1. Cut the paper evenly between the roll and platen.



2. Pull the release lever forward and pull the paper up and out.

Testing the Printer

Your printer can be tested at any time to determine if all the letters and numbers are printing correctly. This is done as follows:

1. Turn the power to the printer to "off".

2. While holding the Line Feed button down, turn the power "on".

   The printer will print all characters in the following fashion:

```
8888888888888888888888888888888888888888
9999999999999999999999999999999999999999
::::::::::::::::::::::::::::::::::::::::
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
========================================
>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
????????????????????????????????????????
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
```

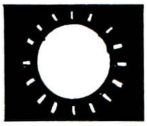
3. Turn the power to the printer to "off" to stop printing.

Special Programming Considerations

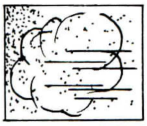
The PC-6021A Thermal Printer is capable of understanding special printing instructions from your programs. Refer to the Specifications Section in the back of this book for more detailed information.

Maintenance Tips

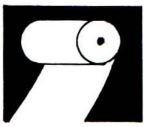
The Thermal Printer is designed to give you many hours of useful operation By taking a few precautions you can insure long-lasting operation from your durable printer. If you fail to observe these precautions, your printer may experience unnecessary failure



1. Keep the printer away from direct sunlight.



2. Keep the unit away from dust and dirt.



3 Never use the printer without paper

Troubleshooting

If the PC-6021 A Thermal Printer does not print correctly, check the following items

- ☐ Is the power turned on? See page 54.
- ☐ Is there paper in the unit? See page 53.
- ☐ Does the paper line feed easily? See page 53.
- ☐ Is the paper inserted with the shiny side out? See page 53.
- ☐ Are the cable connectors attached correctly? See page 17.

After all of the above items have been checked, and your PC-6021 A Thermal Printer still does not perform properly, contact your Authorized NEC Home Electronics Dealer, or contact NEC Home Electronics at the following address

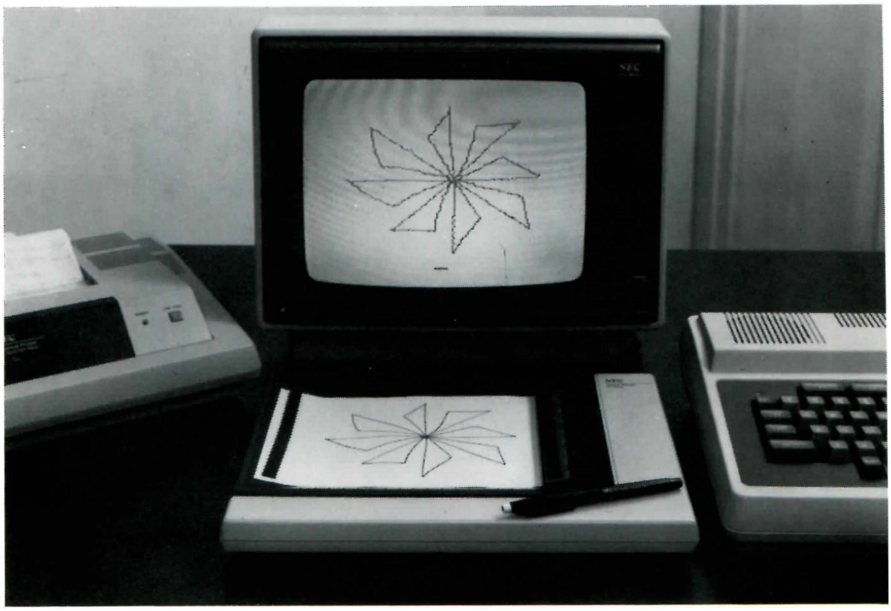
1401 Estes Avenue
Elk Grove Village, Illinois 60007

Your PC-6000 A is a well-built, reliable system, however, as with any piece of electronic equipment, there may be times when repairs are necessary NEC Home Electronics provides an Extended Warranty for times such as this at a low annual fee. For information on ordering an Extended Warranty for your system, refer to the Extended Warranty Request card that came with your PC-6001 A User's Guide and component pamphlets

Chapter 7:
The Touch Panel

Your PC-6000 A computer becomes even more enjoyable with the addition of your new PC-6051 Touch Panel. Now you can instantly create graphic displays on the screen by simply drawing a picture on the Touch Panel. Graphs, bar charts, pictures and many other visuals that previously required complicated programming can be created quickly and easily!

With your new Touch Panel, what you draw on paper is what you get on the screen. And the Touch Panel has a built-in guide to aid you in drawing vertical and horizontal lines. The Touch Panel provides hours of entertainment as well as an easy way to include sophisticated graphics in your own programs.



In other computers, graphic images have to be programmed through the use of a keyboard. This requires that every point of the drawing be input in the form of coordinates, requiring extensive time to create a simple sketch. With the Touch Panel, the coordinates are created by the computer merely by drawing the sketch on the Touch Panel. Therefore, everyone becomes an expert with computer graphic displays right away.

There are a number of different ways you can use the Touch Panel. NEC Home Electronics offers a ROM cartridge that lets you use the screen as your canvas. And you can print out the illustration as it appears on the screen with the Thermal Printer. You can even save it on cassette tape. You can use the Touch Panel to dupliate a diagram or you can draw a figure that you define.

Using the Touch Panel

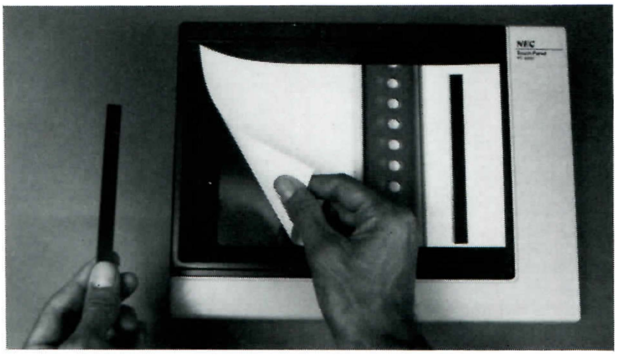
The Touch Panel uses two resistance sheets that overlap one another with very little space in between. By applying a minimum amount of pressure to the top panel, your impression is communicated to the computer.

To protect the resistance sheets from being damaged, always use a protective sheet of paper. The protective sheet can be easily replaced.

Use a pen with a soft tip (felt-tip). It is not necessary to apply excessive pressure!

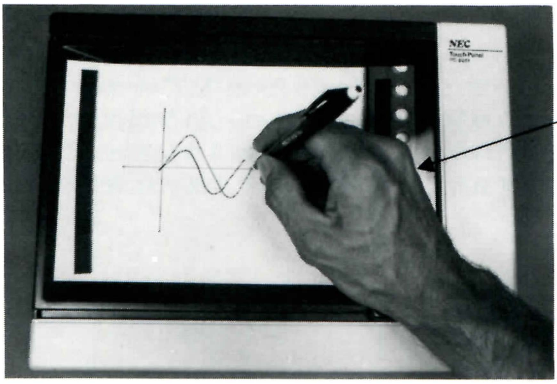
Loading the paper

1. Remove the magnetic strips from both sides of the drawing panel.
2. Insert paper under the plastic slide guide.
3. Replace the magnetic strips to hold the paper in place as you draw.



Drawing on the Touch Panel

1. Never write directly on the plastic drawing surface. Always insert paper first.
2. Insert the Touch Panel cartridge*.
3. Use only a felt-tip marker.
4. Never press too hard with marker, light, even pressure is best.



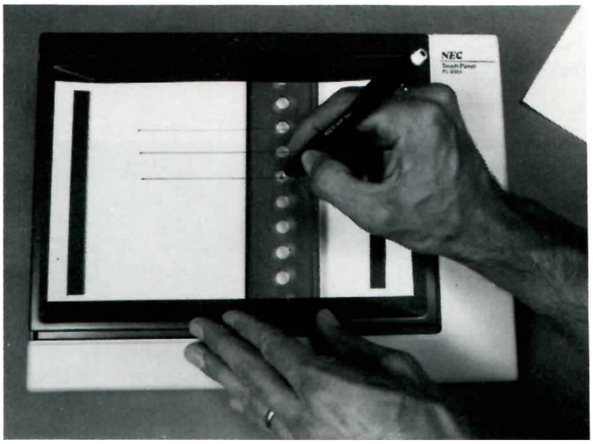
Do not place your hand on the paper. Use the slide rest.

You can draw straight vertical and horizontal lines by using the Touch Panel slide guide. The slide guide is permanently attached to your Touch Panel and should be moved over to the right when not being used.

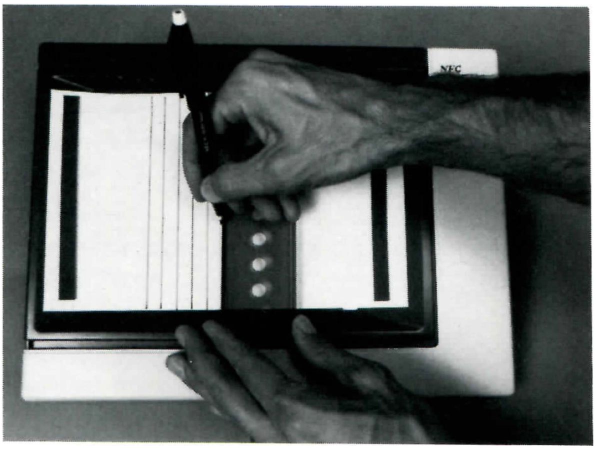
* Cartridge is included with your PC-6051 Touch Panel

Using the Slide Guide

1. To draw horizontal lines, insert the marker into one of the holes in the slide guide Move the slide guide gently across the paper.



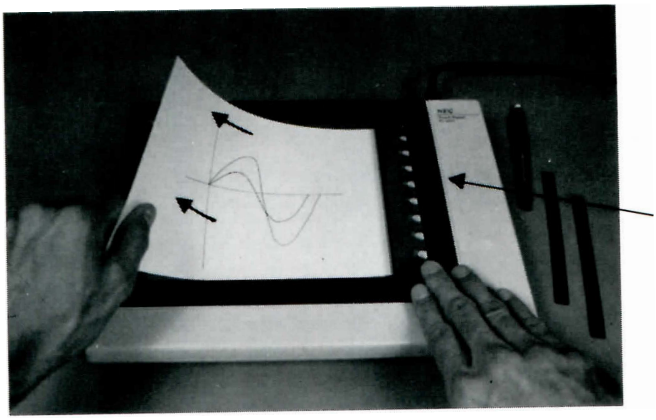
2. To draw vertical lines, hold the slide guide in place with one hand, then move the marker along the outside edge.



It is important that you remove the protective paper should it tear or become excessively worn. You will probably want to change the paper as often as you change designs. To do so is easy.

Removing the Paper

1. Move the slide guide all the way to the right.
2. Remove the magnetic strips from the paper.
3. Using fingers and thumb, pull the paper upwards as in the illustration

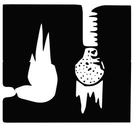


Lift paper in direction of arrows.

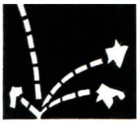
Move slide guide to the right of the drawing panel.

Maintenance Tips

The Touch Panel is made of durable mylar so it is easy to take care of. Some precautions are needed owever. Failure to observe these precautions may result in untimely equipment problems.

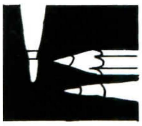


1. Keep it away from extreme heat and cold.

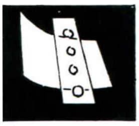


2 Do not drop the Touch Panel as you may damage the delicate circuitry inside of it.

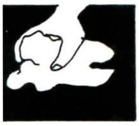
3. Do not place any objects on top of it so as not to damage the drawing panel.



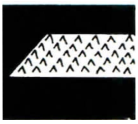
4. Use only a felt-tip marker. Pencils and ballpoint pens will scratch the drawing panel surface.



5 Never write directly on the drawing panel Always insert paper before drawing.



6. Use a soft damp cloth (not dripping) to wipe the surface of the Touch Panel.



7. Any abrasive material can cause damage to the surface.

Troubleshooting

If no image appears on the monitor as you use the Touch Panel, check the following items

Check List:

☐ Is the cable properly inserted to the Touch Panel and the console? See page 18.

☐ Is the proper cassette properly inserted into the console? See page 18

☐ Is the console power on? See page 13.

☐ Is the monitor power on? See page 27.

After all of the above items have been checked, and your PC - 6051 A Touch Panel still does not perform properly, contact your Authorized NEC Home Electronics Dealer, or contact NEC Home Electronics at the following address:

1401 Estes Avenue
Elk Grove Village, Illinois 60007

Your PC-6000 A is a well-built, reliable system, however, as with any piece of electrical equipment, there may be times when repairs are necessary. NEC Home Electronics provides an Extended Warranty for times such as this at a low annual fee. For information on ordering an Extended Warranty for your system, refer to the Extended Warranty Request card that came with your PC-6001 A User's Guide and component pamphlets.

Chapter 8:
The Expansion Unit (PC-6011 A)

The PC-6011 A Expansion Unit allows you to double the size of the PC-6000 A Series computer's memory and makes the use of disk storage a reality. The programs you create can now be twice the size and complexity. With the PC-6031 A Disk Drive attached, additional storage is available on floppy diskettes.

The Expansion Unit is merely an extension of your current PC-6001 A computer. Installation is incredibly simple, just plug it in. Within minutes you will have a computer that is twice as powerful.

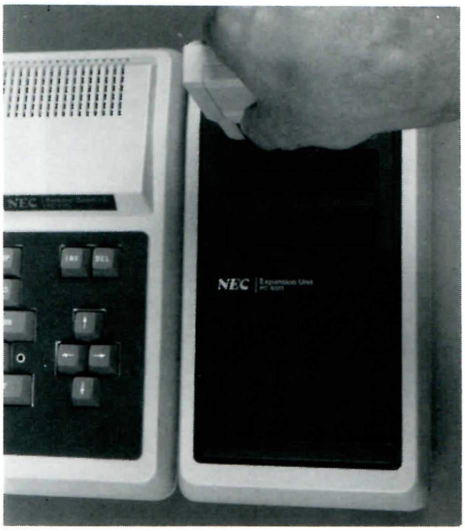
NEC
Expansion Unit
PC-6011
INS
DEL

Using the Expansion Unit

1. Inserting cartridges
   - The ROM cartridge
   - ROM/RAM cartridge

The PC-6011 A Expansion Unit is equipped with three Cartridge Inserting Slots This lets you insert up to two combinations of cartridges, putting more power at your fingertips When using a cartridge, any of the slots may be used. Any unused slot should be covered with the sliding door to keep dust out.

To insert a cartridge, simply open the sliding door of the inserting slot on the Expansion Unit and insert the desired cartridge. Do not force the cartridge If the cartridge is not fully inserted, no power will be supplied to the Expansion Unit.

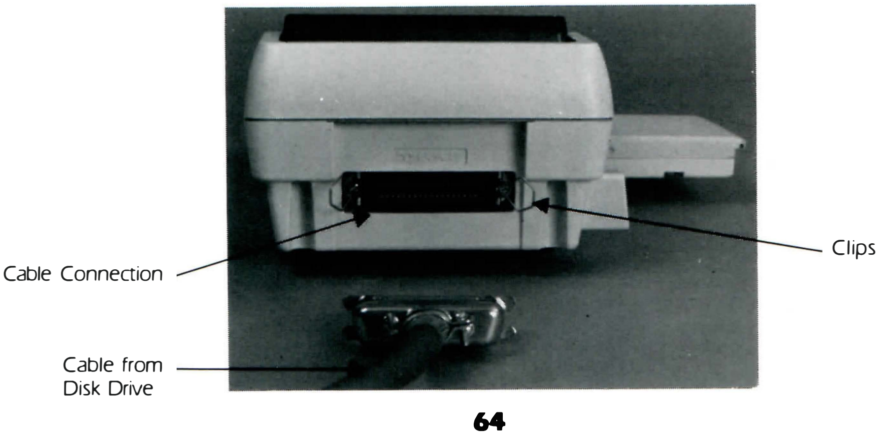


Check with your authorized NEC Home Electronics dealer for more information about available cartridges and other software.

Using the Expansion Unit with The Disk Drive

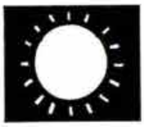
- Extended Basic

To use the Expansion Unit with the PC-6031 A Disk Drive unit, simply plug the drive into the rear of the Expansion Unit using the pin connector cord and insert the Extended BASIC ROM Cartridge or any other NEC cartridge for the PC-6001 A into one of the cartridge insertion slots.

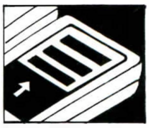


Maintenance Tips

The Expansion Unit is a self-contained durable unit, however some precautions should be taken. Failure to observe these precautions could result in untimely equipment problems.

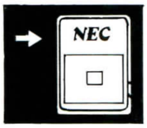


1. Keep out of direct sunlight.

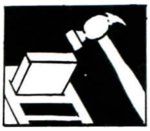


2. Keep the cover in place when the insertion slots are not being used.

3. Keep drinks and liquids away from the three ROM slots



4. Do not insert anything other than NEC-approved cartridges



5. Do not force cartridges.

Troubleshooting

If no image appears on the screen, or if you cannot get the cartridges to work, check the following items

Check List

- ☐ Is the Expansion Unit pushed securely into the cartridge insertion port of the PC-6001 A keyboard? See page 19.
- ☐ Is the cartridge pushed securely into the Expansion Unit? See page 64.
- ☐ Is the cartridge good? Have you tried another? See page 65.

After all of the above items have been checked, and your PC-6011 A Expansion Unit still does not perform properly, contact your Authorized NEC Home Electronics Dealer, or contact NEC Home Electronics at the following address

1401 Estes Avenue
Elk Grove Village, Illinois 60007

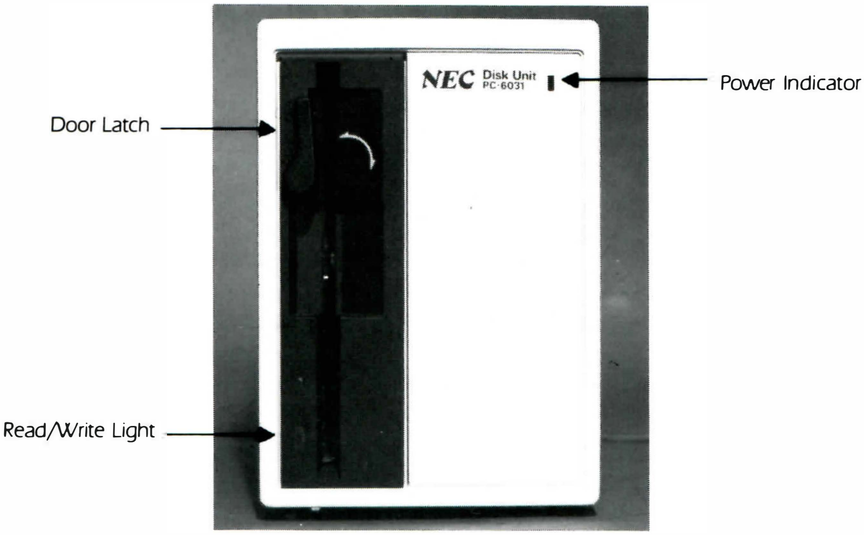
Your PC-6000 A is a well-built, reliable system, however, as with any piece of electronic equipment, there may be times when repairs are necessary. NEC Home Electronics provides an Extended Warranty for times such as this at a low annual fee For information on ordering an Extended Warranty for your system, refer to the Extended Warranty Request card that came with your PC-6001 A User's Guide and component pamphlets.

Chapter 9:
The Disk Drive (PC-6031 A)

The PC-6031 A Disk Drive immediately gives your PC-6001 A the power of information storage and retrieval. The disk unit allows you to enter over 140,000 characters, save them, bring them back to the screen or direct them to the printer - whatever you choose. The disk unit lets you control how the information will be used. With your new disk drive you also have the speed and efficiency of data files. This means you can create sophisticated programs that talk to the disk unit.

Your disk unit aids you in developing your programming skills while providing a much faster method of gathering stored data In addition, a variety of software is available by the PC-6001 A on pre-recorded diskettes. Check your reference manual for more information on file handling.

Using the Disk Drive

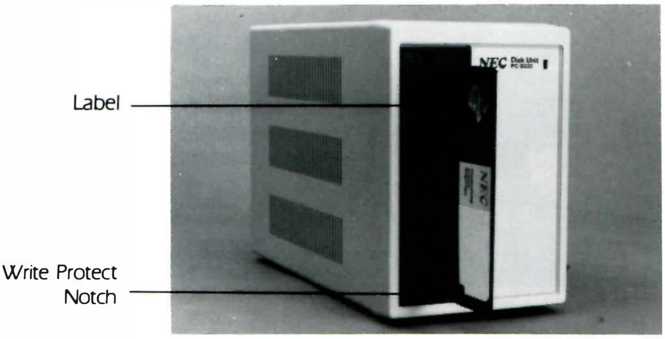

NEC Disk Unit PC-6031
Power Indicator
Door Latch
Read/Write Light

Inserting the Diskette

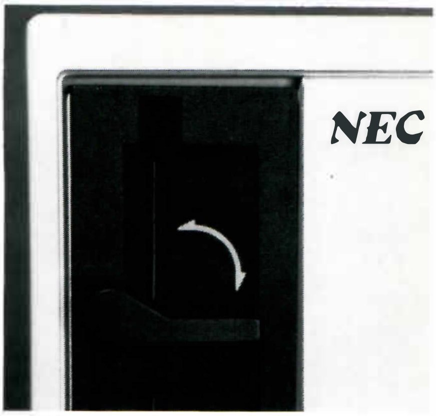
1. Place the Extended BASIC cartridge into the PC-6011 A Expansion Unit. Refer to the PC-6011 A section for information about cartridge insertion.

2. Power must be supplied to the unit by flipping the power switch to on.

3. Insert the system diskette into the drive, making sure that the read/write light is off.


Label
Write Protect Notch

4. Push the disk load lever to the right.



5. Turn on the PC-6001 A power.

Saving a Program

When you want to store a program on a diskette you SAVE it. Saving a file or program is very easy.

Type in SAVE "Program name" and press the RETURN key. When the file is saved, the computer prints OK.

NOTE: You must put quotation marks around the program name.

Loading a Program

When you wish to take a program that is stored on a diskette and put it into the computer's memory so that you can access it, use the LOAD command. This is very easy! Type in LOAD "program name" and press the RETURN key. When the program is loaded, the computer prints OK.

NOTE: You must put quotation marks around the program name, and you must spell the name exactly the way it was spelled when it was saved. (Pay attention to upper and lower case letters. They must be the same.)

Running a Program

When you want to take a program that is stored on a diskette, put it into the computer's memory and execute it, use the RUN command. Type in RUN "program name" and press the RETURN key. When the program is loaded into the PC-6001 A 's memory, it is automatically executed.

NOTE: You must put quotation marks around the program name and the name must be spelled exactly as it was spelled when it was saved.

**** IMPORTANT ****

Always make a back-up copy of your master utility disk immediately. Store your original in a safe place and use your back-up copy as your working copy. (Refer to the following Sections for formatting and making back-up copies instructions.)

Diskette Utilities

Formatting a Diskette

Whenever a new diskette is to be used with the PC-6031 A Disk Drive, it must be initialized or formatted. This is done with a program that is stored on the Utility disk called FORMAT. The procedures for formatting a diskette are very easy.

NOTE: Be sure your system has been connected properly before turning the power on to each component of your system.

1. Insert the Utility Disk into the PC-6031 A and close the drive door.

2. Press the RESET switch on the PC-6001 A console.

3. When the monitor screen displays the following message:

   How Many Files?

   Press the RETURN key.

   The screen will display:

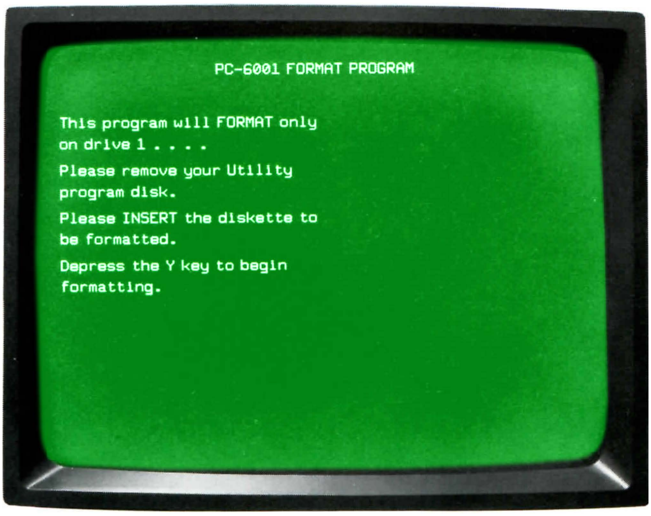
   How Many Pages?

   Press the RETURN key.

4. Type in load "format" and press the RETURN key.

5. Type in run or press F5 and press the RETURN key.

The following will then be displayed on the screen:

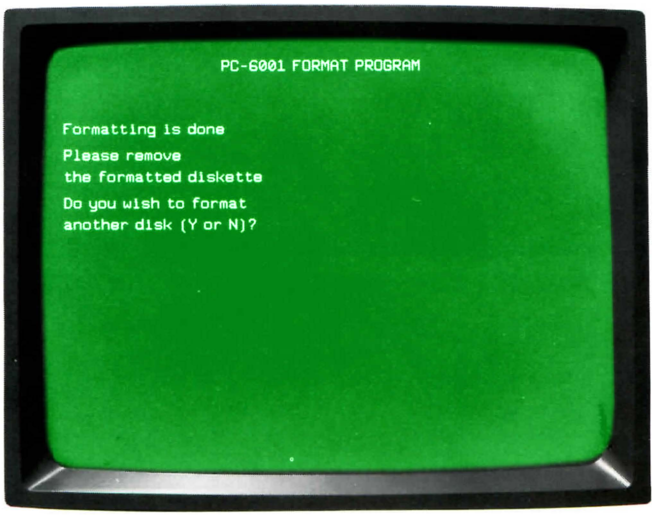


```
PC-6001 FORMAT PROGRAM

This program will FORMAT only
on drive 1 . . . .
Please remove your Utility
program disk.
Please INSERT the diskette to
be formatted.
Depress the Y key to begin
formatting.
```

NOTE: Be careful not to format important diskettes because it erases files that are saved on the diskettes.

6. As instructed, remove the Utility Disk from the drive and insert the diskette to be formatted and close the drive door.

7. Press the Y key to begin the formatting. When the formatting is complete, the following will then be displayed on the screen

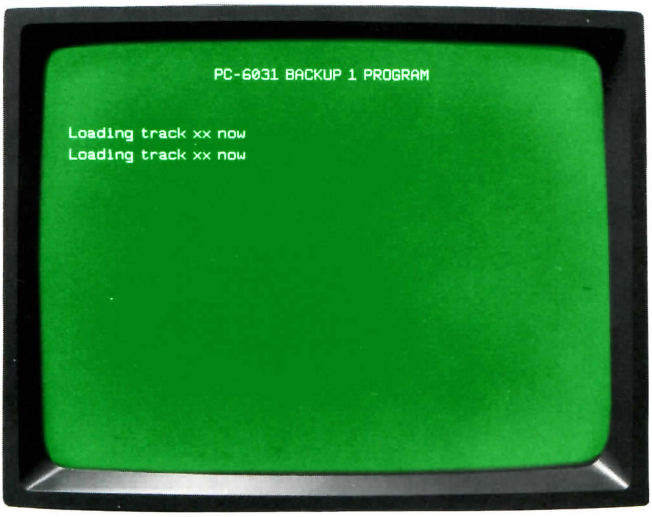


```
PC-6001 FORMAT PROGRAM

Formatting is done
Please remove
the formatted diskette
Do you wish to format
another disk (Y or N)?
```

If you wish to format another diskette, press the Y key. If you have no other diskettes to be formatted, press the N key.

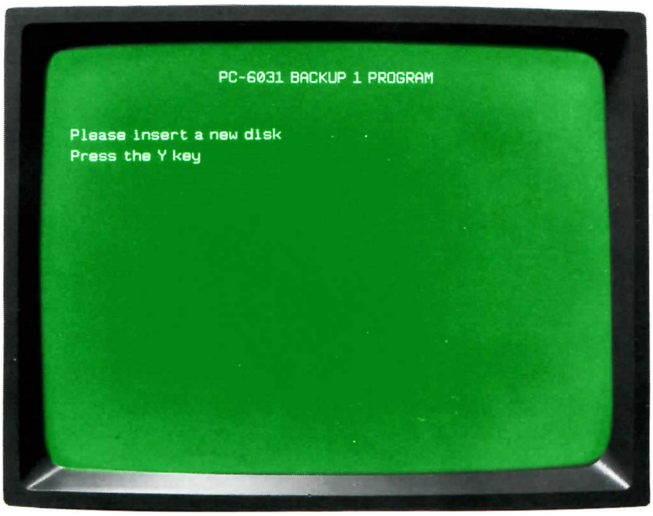
8 Insert the master diskette into the drive and close the drive door. Then, press the Y key and the backup procedure will begin.

The data on each two tracks of the master diskette will then be stored into the memory of the PC-6001 A . While this is being done, the following will appear on the screen



```
PC-6031 BACKUP 1 PROGRAM

Loading track xx now
Loading track xx now
```

Once the two tracks have been successfully loaded, the following message will appear on the screen:



```
PC-6031 BACKUP 1 PROGRAM

Please insert a new disk
Press the Y key
```

(A new disk is one that has been previously formatted)

DISK UTILITIES

Backing Up a Diskette

Backing up a diskette is the very useful procedure of making a copy of one diskette onto another diskette. This is very similar to recording a record album onto a tape. **It is a good idea to backup all of your important program and data diskettes** (such as your master utility disk). Store the original diskettes in a safe place and use the copies for everyday use. If you do this, you will always have a copy if one of your diskettes is lost or damaged. The procedures for backing up are easy. The steps below lead you through backing up a diskette with a single disk drive. **If you have two disk drives, go on to the instructions following these.**

NOTE: Before using the Backup program, your disk must be formatted. (Refer to section on Formatting a Disk.)

1. Insert the Utility Disk into the PC-6031 A Disk Drive and close the drive door.

2. Press the RESET switch on the PC-6001 A Keyboard Unit.

3. When the monitor screen displays the following message:

   How Many Files?

   Press the RETURN key.

   Then the screen will display:

   How Many Pages?

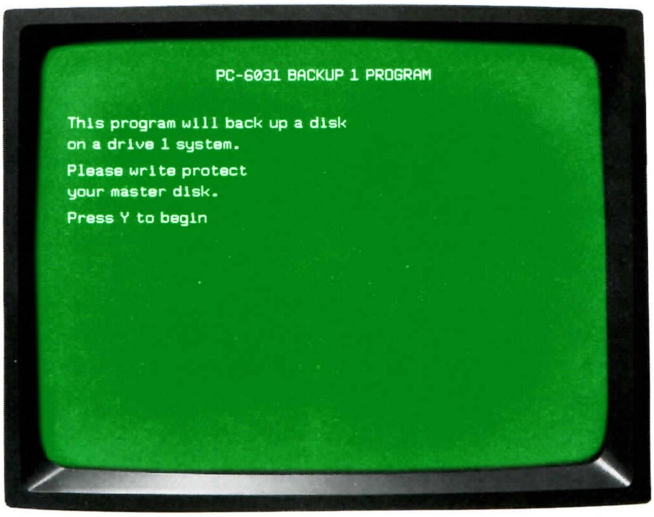
   Press the RETURN key.

4. Now, type in load "backup.1" and press the RETURN key.

NOTE: backup.1 is the name of the program for backing up with one disk drive.

5. Type in run or press F5 and press the RETURN key.

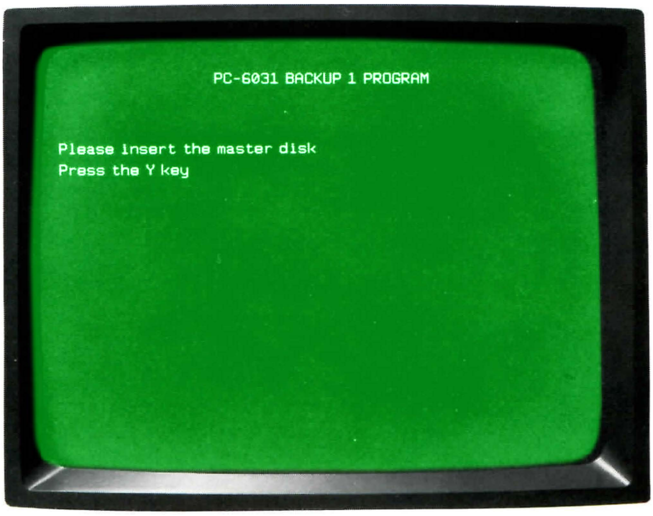
The following will then be displayed on the screen



```
PC-6031 BACKUP 1 PROGRAM

This program will back up a disk
on a drive 1 system.
Please write protect
your master disk.
Press Y to begin
```

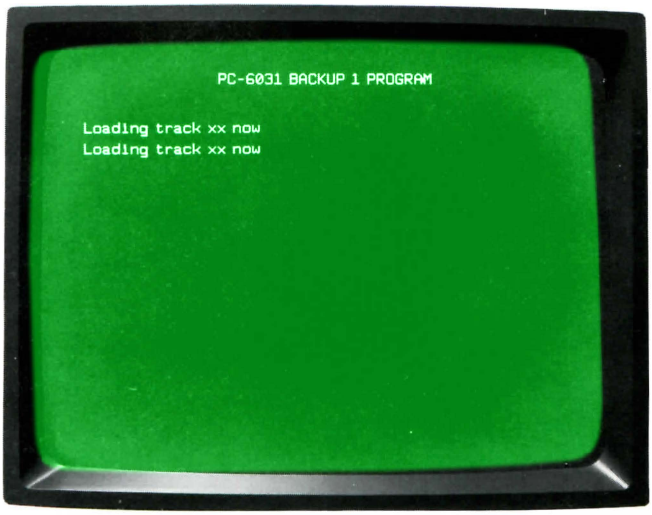
6. Remove the Utility Disk from the drive. Write protect your master diskette (the one that is to be copied). Refer to Maintenance Tips for instructions

7. Depress the Y key. The following will then be displayed on the screen:



```
PC-6031 BACKUP 1 PROGRAM


Please insert the master disk
Press the Y key
```

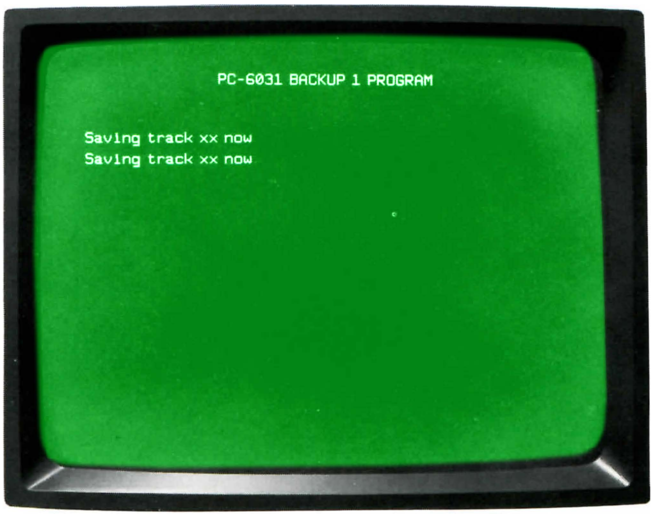
8 Insert the master diskette into the drive and close the drive door. Then, press the Y key and the backup procedure will begin



```
PC-6031 BACKUP 1 PROGRAM

Loading track xx now
Loading track xx now
```

9. Remove the master diskette from the drive and insert the diskette that you wish to copy onto into the drive. Close the drive door and press the Y key.

   The data that was previously stored in the computer's memory will then be saved onto the new diskette. While this is taking place, the following will appear on the screen:



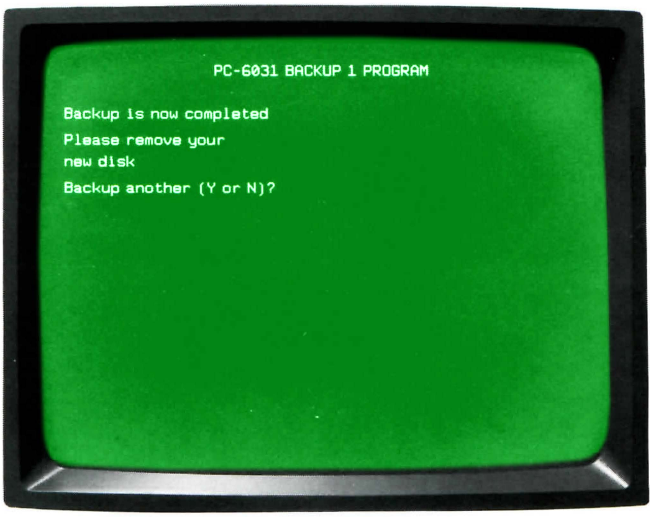
```
PC-6031 BACKUP 1 PROGRAM

Saving track xx now
Saving track xx now
```

Your backup.1 program copies a maximum of two tracks at a time.

10. Repeat steps 8 and 9 until all tracks of the master diskette are copied.

When a diskette is formatted or copied onto, any information that is already on the diskette will be erased.

When the backup is completed the following will display on the screen:



```
                PC-6031 BACKUP 1 PROGRAM

Backup is now completed
Please remove your
new disk
Backup another (Y or N)?
```

If you have no more diskettes that you wish to copy, remove your new diskette and press the N key. If you want to backup another diskette, press the Y key and replace the master diskette that is in drive 1 with the new master diskette. Place another diskette in drive 2 and proceed from step 7.

Backing Up a Diskette with a Two Drive (PC-6031 A and PC-6032 A) System

The following steps explain how to backup a diskette when you have a PC-6032 A Expansion Disk Drive hooked up.

1. Insert the Utility Diskette into the PC-6031 A Disk Drive (drive 1) and close the drive door.

2. Press the RESET switch on the PC-6001 A console.

3. When the monitor screen prompts:

   How Many Files?

   Press the RETURN key.

   When the monitor screen prompts:

   How Many Pages?

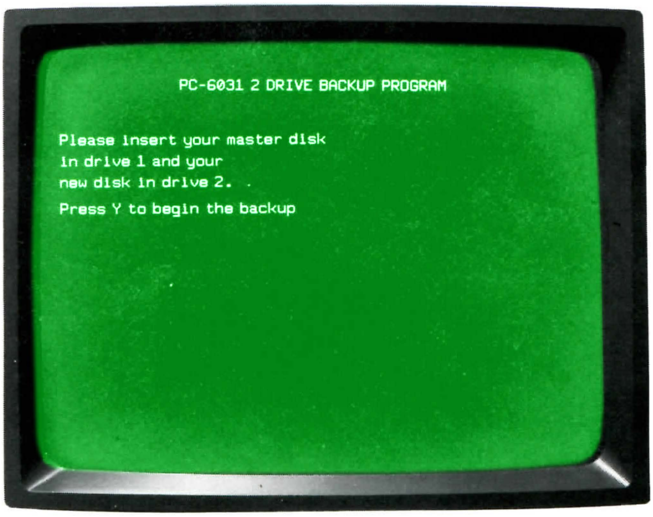
   Press the RETURN key.

4. Type in load "backup.2" and press the RETURN key.

NOTE: backup.2 is the name of the program used to copy a disk when you have 2 disk drives.

5. Type in run or press the F5 key and press the RETURN key.

The following will then be displayed on the screen:

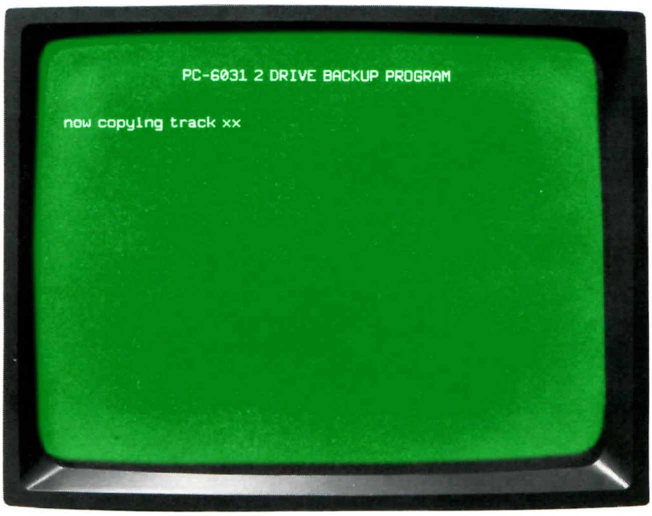


```
                PC-6031 2 DRIVE BACKUP PROGRAM

Please insert your master disk
in drive 1 and your
new disk in drive 2. .
Press Y to begin the backup
```

6. Remove the Utility Disk from drive 1 and insert the master diskette (or the one that is being copied) in its place. Now, put the new formatted diskette into drive 2 (PC-6032 A.) and close both drive doors.

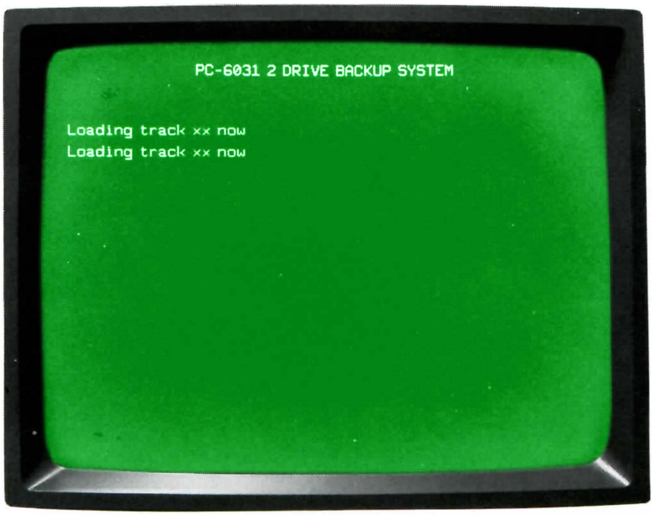
NOTE: A diskette must be formatted before information can be stored on it.

7. Press the Y key to begin the backup procedure. The following will display on the screen until all tracks of the master diskette are copied.



```
                PC-6031 2 DRIVE BACKUP PROGRAM

now copying track xx
```

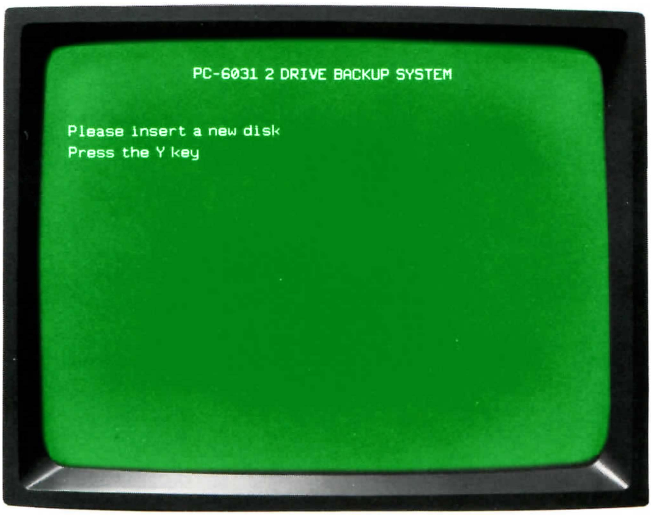
8. The data on each two tracks of the master diskette will then be stored into the memory of the PC-6001 A While this is being done, the following will appear on the screen



```
PC-6031 2 DRIVE BACKUP SYSTEM

Loading track xx now
Loading track xx now
```

Once the two tracks have been successfully loaded, the following message will appear on the screen:

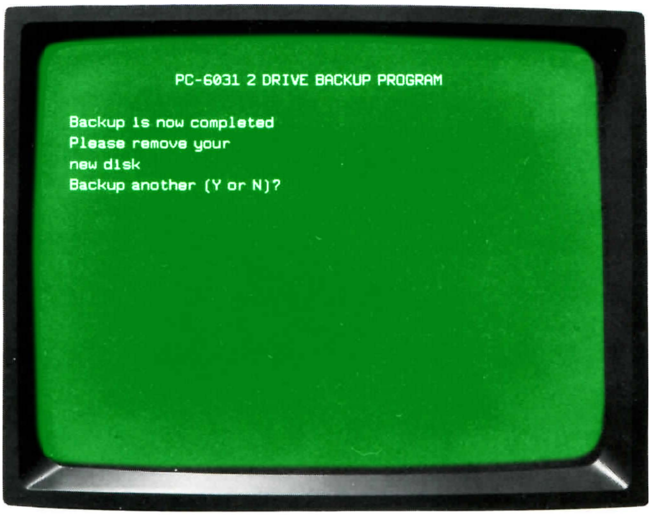
*



```
PC-6031 2 DRIVE BACKUP SYSTEM

Please insert a new disk
Press the Y key
```

(A new disk is one that has been previously formatted).

When the backup is completed the following will display on the screen.



```
            PC-6031 2 DRIVE BACKUP PROGRAM

Backup is now completed
Please remove your
new disk
Backup another (Y or N)?
```

If you have no more diskettes that you wish to copy, remove your new diskette and press the N key. If you want to backup another diskette, press the Y key and replace the master diskette that is in drive 1 with the new master diskette. Place another diskette in drive 2 and proceed from step 7.

Troubleshooting

The PC-6031 A Disk Drive Unit is a well-built, reliable unit. If it does not perform properly, check the items listed below.

If the Disk Drive door cannot be closed, check the following items

- ☐ Is the diskette inserted properly? See page 68.
- ☐ Insert the diskette again. See page 68.

f the Disk Drive does not work, check the following items:

- ☐ Is the power indicator light on? If not, is the power turned on? Is the power cord plugged in? See page 68
- ☐ Is the Disk Drive door closed? See page 68.
- ☐ Is a diskette in the Disk Drive? See page 68.
- ☐ Is the diskette inserted properly? See page 68.
- ☐ Remove the diskette and insert it again See page 68
- ☐ Have you tried another diskette? See page 68
- ☐ Is the N60 - Extended BASIC Cartridge (PSC-6001RA) inserted into the PC-6011 A Expansion Unit? See page 64.

If programs cannot be loaded from the diskette, check the following items:

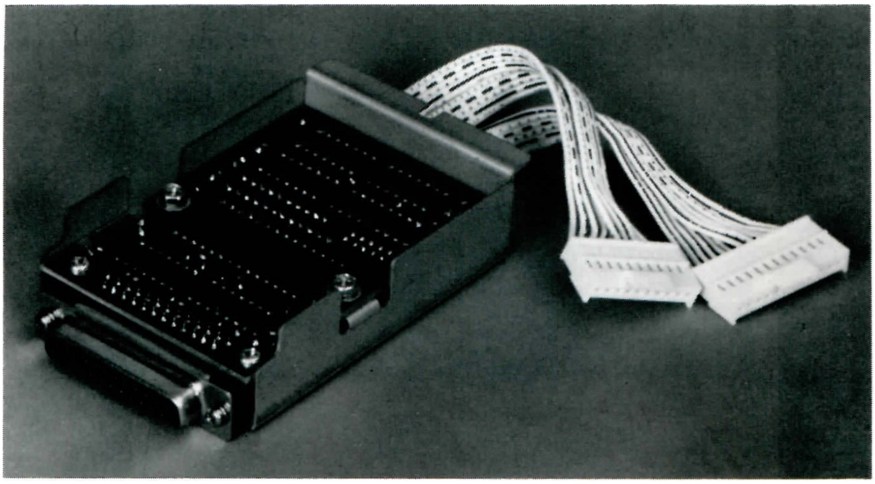
- ☐ Are the files to be loaded saved on the diskette? See page 69.
- ☐ Are you inputting the correct drive number? See page 73

After all of the above items have been checked, and your PC-6031 A Disk Drive Unit still does not perform properly, contact your Authorized NEC Home Electronics Dealer, or contact NEC Home Electronics at the following address

1401 Estes Avenue
Elk Grove Village, Illinois 60007

Chapter 10:
The RS-232C Interface

The PC-6000 A Series offers an optional RS-232C Interface board (PC-6061 A) that can be inserted into your computer. The RS-232C serial interface gives you the power to let your computer talk to other computers and take advantage of professional time sharing services.



The RS-232C interface is an industry-standard interface for sending messages from one computer to another. Although the PC-6000 Series offers many fine components, with the RS-232C interface you can use virtually any other RS-232C compatible component.

With the RS-232C interface and a modem your PC-6000 A Series can be used in a computer network to send or receive information That makes it possible to talk to just about any computer, anywhere using an ordinary telephone

The RS-232C interface allows for easy plug-in capability to countless existing devices or others that have yet to be developed. This interface sends a serial output to a printer or other serial devices This universal interface is being used as a standard by almost everyone For detailed information about the installation, operation, and specifications of the RS-232C interface, use the booklet that comes packaged with the unit.

Contact your authorized NEC Home Electronics dealer of NEC Home Electronics (USA) for installation of your RS-232C and communication software packages available for the PC-6000 A .

Chapter 11:
The Monitor

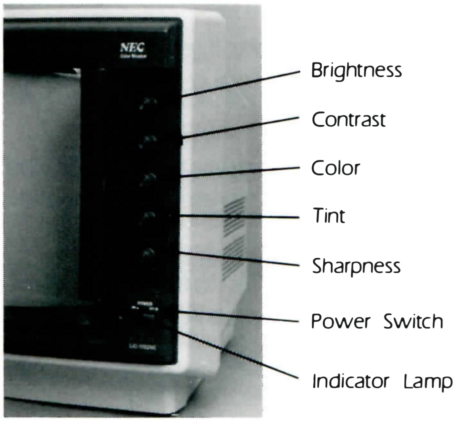
With the PC-6000 A Series you have a choice of three monitors from NEC Home Electronics. Each is designed for use with the PC-6000 A Series. Each offers high reliability, high resolution and easy maintenance. Illustrated here is the JC1212 composite color monitor. With the exception of the controls for color, each of these monitors operates the same.

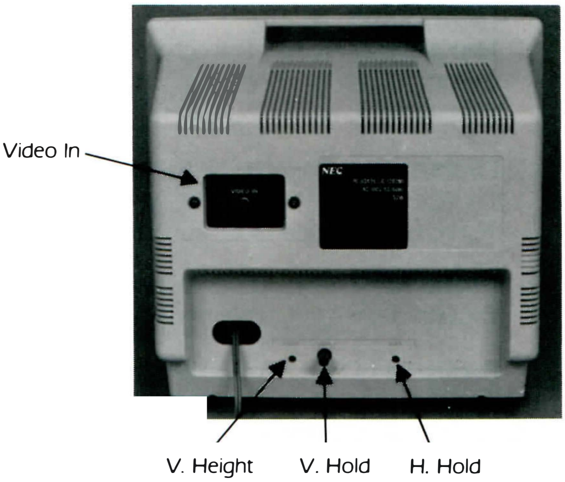
JB-1201M is a 12 inch diagonal picture tube which offers a green phosphor display for "non-tiring" easy reading The picture quality is always superb thanks to its high resolution display.

JB-902 is a 9 inch diagonal picture tube which offers a green phosphor display for easy reading. With its high resolution display, the picture is always crisp and clear.

JB-1260M is a 12 inch diagonal picture tube whose stable and well-designed circuitry provides excellent imaging as well as high reliability. The CRT is a green matrix screen image

JC-1212 is a 12 inch diagonal picture tube that offers crisp distinctive color images as well as high reliability. This display is excellent for use with PC-6000 A Series Touch Panel and other color-related computer activities





How to Use the NEC Monitor

1. Once you have the power to your PC-6001 A console turned on, you can turn on the power to your monitor. Simply pull the power switch gently towards you or press the ON/OFF switch and the screen will be illuminated soon afterwards. When using the monitor with the PC-6000 A System there is no need to increase the volume as the audio for this system is handled by the PC-6001 A console.

   Notice that the indicator lamp will be illuminted when the monitor is on.

2. **Contrast** - Adjust the screen to obtain your desired contrast. The contrast becomes stronger when the contrast knob is turned clockwise.

3. **Color Control** - Once you load the color program from the demonstration tape, you can adjust the color. The tone of color deepens when the color control knob is turned clockwise. Color disappears completely when this knob is turned all the way in a counterclockwise direction. The color should be adjusted using green as the base color.*

4. **Tint** - This adjustment is used in conjunction with the color control. Turn the tint control clockwise to accentuate green. Turn it counterclockwise to deepen the purple tint. This knob gives a clicking sound when it is turned approximately halfway in its full rotation. Set the knob to this point to obtain the most natural tone.

5. **Brightness** - This control is used to adjust the overall brightness of the screen and can be used to compensate for variations in room lighting.

6. **Horizontal Hold** - This control allows adjustment of horizontal stability. If the picture "tears" toward the left or right, or appears as diagonal stripes across the screen, adjust this control until the picture stabilizes.

7. **75 Terminal Switch** - Slide this switch to the lower side when the monitor is being used with the PC-6000 System. Slide the switch to the upper side when connected to an instrument with higher output impedance such as a 300 OHM video recorder.

8. **Video In** - The video signal from the PC-6001 A computer should be fed to the Video In jack through a shielded cable and RCA phono plug supplied with the PC-6071 A/

9. **Audio In** - The audio signal from the PC-6001 A computer console should be fed to the Audio In jack through a shielded cable and RCA phono plug

   * In order to set the color tone correctly, load the COLOR program from the demonstration tape supplied with the PC-6001 A console and allow it to appear on the screen. The color sequence on the screen is green, blue, red and white (from left to right). Adjust the monitor so that these color are in the right sequence.

WARNING: Damage could result to your monitor or TV screen if the brightness control is turned on fully for a long period of time while using a program.

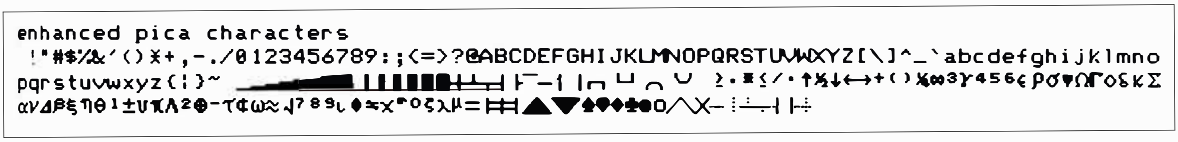
NOTE: Monitor controls will vary for each model.

Chapter 12:
The Dot Matrix Printer

The PC-6000 A Series can use either of two printers - the Thermal Printer or the Dot Matrix Printer which allows for sophisticated business letters, reports, and graphics on your own letterhead or standard 8½"x11" paper.

The NEC Home Electronics PC-8023A-C printer is a dot matrix, bi-directional printer. Bi-directional means that it prints going in both directions (right to left and left to right) for increased speed. The PC-8023A-C includes complete upper and lower case characters, Greek, mathematic and graphic characters, along with the ability to print dot matrix graphic screen images on paper.

This printer also offers five unique alphabets and twelve different character sizes. To top it off, the true incremental printing allows intermixed fonts on one line. See the test pattern below for an example of the unique characters that the PC-8023A-C can print.



```
enhanced pica characters
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
pqrstuvwxyz{¦}~
```

The PC-8023A-C has a parallel interface which is standard for easy compatibility with most other microcomputers.

The PC-6094 A printer cable can be used with the PC-8023A-C.

NOTE: The following program can be used to drop the non-ASCII (special graphics) to the PC-8023 A-C printer.

```
10      FOR I=&H20 TO &HFE : A=I : GOSUB 100 : NEXT I
99      END
100     IF INP(&HC0) AND 1=0 THEN 100 — STATUS? OF PRINTER (READY)
110     OUT &H91.NOT(A) AND &HFF : OUT &H93,1 : OUT & H93,0 — STROBE THE
        PRINTER PORT TO TELL IT TO ACCEPT THE CHARACTER
120     RETURN
```

The LCOPY command does not work on the PC-8023 A-C printer.

SECTION IV

SPECIFICATIONS FOR THE PC-6001 A SYSTEM

Contained in the following pages are the technical specifications for the PC-6001 A and its components. This section is sequenced as follows:

1. Major Functions & Features of the PC-6001 A
2. PC-6000 A Family of Components
3. PC-6000 A Series Product Table
4. PC-6000 A System Specifications
5. PC-6000 A Memory Maps
   a. 16K base system
   b. 32K base system
6. PC-6000 A Keyboard Character Charts
   a. Character Code Chart
   b. Alternate Character Set and Special Characters

7 Specifications for the PC-6000 A Series Components
   a. PC-6005 A ROM Cartridge
   b. PC-6006 A ROM & RAM Cartridge
   c. PC-6082 A Data Recorder
   d. PC-6021 A Thermal Printer
   e PC-6031 A & PC-6032 A Disk Drives
   f. PC-6051 Touch Panel

8. Specifications for NEC Home Electronics Display Monitors
   a JB-1260M A Monochrome Display Monitor

CRT	High contrast, dark bulb, 12 inch diagonal, 90° deflection Phosphor P31 (green)
Scanning Frequency	
Horizontal	15.75kHz
Vertical	60Hz
Resolution	
Horizontal	600 lines (at center)
Vertical	230 lines
Video Bandwidth	15MHz
Input Signal	Video Composite
Active Display Area	180(W)x137(H)mm
User Controls	On/Off, Brightness, Contrast, H. Hold, V. Hold
Power Consumption	30 watts
Dimensions	386(W)x285(H)x292(D)mm
Display Characters	80 Characters with 25 lines—8x8 dots
Weight	6.5kg

   b. JB902M A

CRT	9 inch diagonal, 90° deflection Phosphor P31 (green)
Scanning Frequency	
Horizontal	15.75kHz
Vertical	60Hz
Resolution	
Horizontal	700 lines (at center)
Vertical	230 lines
Video Bandwidth	200MHz
Input Signal	Video composite
Active Display Area	165(W)x126(H)mm
User Controls	On/Off-Volume, Brightness, Contrast, H. Hold, V. Hold
Audio Output Power	1.0 watts
Power Consumption	28 watts

Dimensions	270(W)x225(H)x261(D)mm
Display Characters	80 Characters with 25 lines—8x8 dots
Weight	4.7kg

c. JB-1201M A Monochrome Display Monitor

CRT	12 inch diagonal, 90° deflection Phosphor P31 (green) Non-glare screen (ARF)
Scanning Frequency	
Horizontal	15 75kHz
Vertical	60Hz
Resolution	
Horizontal	800 lines (at center)
Vertical	230 lines
Video Bandwidth	20MHz
Input Signal	Video composite
Active Display Area	231(W)x175(H)mm
User Controls	On/Off-Volume, Brightness, Contrast, H. Hold, V. Hold
Audio Output Power	1.0 watts
Power Consumption	30 watts
Dimensions	360(W)x296(H)x330(D)mm
Display Characters	80 Characters with 25 lines—8x8 dots
Weight	6 0kg

d. JC-1212M A Composit Color Display Monitor

9. Specifications for the NEC Home Electronics PC-8023A-C Dot Matrix Printer

Speed	100 characters per second, 44 lines per minute (full 80 column print)
Matrix	7x9 for English characters 8x8 for graphic characters 8x8 for dot graphic printing
Interface	Parallel standard Serial (optional)
Character Set	Standard ASCII set of 96 characters plus numerous Greek, mathematics, and graphic characters
Font Sizes	
136 column	17 char/inch Compressed
68 column	8.5 char/inch Compressed Dbl. W.
80 column	10 char/inch Pica
40 column	5 char/inch Enhanced Pica Dbl. W.
96 column	12 char/inch Elite
48 column	6 char/inch Enlarged Elite Dbl. W. with fixed or proportional spacing 6 or 8 lines per inch plus 1/144 inch incremental line feed
Paper	
Width	4.5-10.0 inches overall, 3.5-9.0 inches center to center
Thickness	.05-.28 millimeter allows original and up to 3 copies maximum of fanfold, roll, or cut sheet
Ribbon	13mm wide, 11 meter long, cartridge
Power Supply	AC 110 V, 60Hz, 16 watts idling, 180 watt operating (maximum)

Features of the PC-6001 A System

1. The UPD780C-1 (Z80A compatible) is used as the main CPU and UPD8049C is used as a sub-CPU This sub-CPU reduces the burden of the main CPU to enhance high speed processing.

.2 The PC-6001 A can be connected either to a professional monitor or an ordinary TV receiver. This is possible because the PC-6001 A has a built in RF output and a video composite output.

3 The PC-6001 A has a built in sound generator LSI which can play a treble chord. The PC-6001 A can also be connected to an external speaker.

4. The PC-6001 A superimposes the characters on the graphic screen for the display which means that the computer can print characters over an existing screen.

5 Available on the display are graphic resolutions of 256 x 192 dots for a monochrome screen and 128 x 192 dotes for 4 color screens.

6. Using optional ROM cartridges (up to 16K), you can run programs without having to use commands.

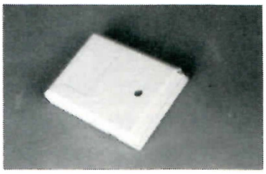
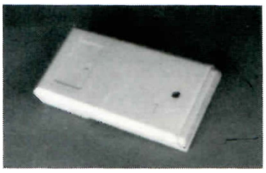
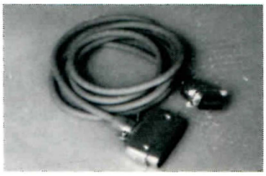
7. The RAM area can be expanded to 32K using the ROM & RAM cartridge.

8. If you are using the optional PC-6061 A board, you can equip your PC-6001 A system with the industry standard RS-232C interface

9. The PC-6001 A is loaded with the industry standard Microsoft compact BASIC language built into its ROM (16K)

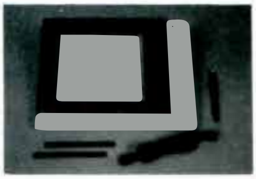
10. Four pages of screen data can be stored in the internal memory of the PC-6001 A (with a 32K RAM system)

THE PC-6000 A FAMILY OF COMPONENTS

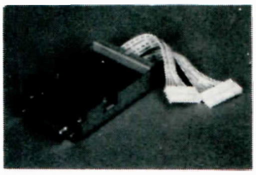
PC-6001 A	The keyboard unit containing the microprocessor, parts and BASIC software.	
CARTRIDGE PROGRAMS	Utilizing 2K, 4K, 8K, or 16K ROM configurations	
PC-6006 A	Expands the memory capacity of the PC-6001 A to 32K.	
PC-6011 A	Expansion unit for PC-6001 A keyboard to allow multiple ROM cartridge insertion, extended BASIC language and Disk Drive operation.	
PC-6021 A	The Thermal Printer that quietly prints upper and lower case and graphic characters. Parallel/Centronic standard interface. Requires PC-6094 A cable for interface with keyboard unit.	
PC-6094 A	The cable that connects the PC-6021 A Thermal Printer to the PC-6001 A keyboard computer.	
PC-6031 A	Floppy disk drive unit that expands storage and program access through the use of diskettes. Requires the PC-6011 A Expansion Unit and the PCS-6001RA Extended BASIC ROM.	
PC-6032 A	Additional floppy disk drive unit that expands storage and program access through the use of diskettes. Requires PC-6011 A Expansion Unit, the PCS-6001RA Extended BASIC ROM and the PC-6031 A disk drive.	

PCS-6001RA Extended BASIC ROM cartridge. Can be used without PC-6031 A .

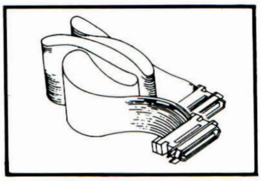
PC-6051 Touch Panel that easily and instantly creates graphic displays without complicated programming. Comes with the Touch Panel ROM cartridge.



PC-6061 A This RS-232C interface and a modem allows the PC-6000 A Series to be used in a computer network to send or receive information. Requires PC-8895 A cable.



PC-8895A Cable for PC-6061 A RS-232C interface.



PC-6091 A Cable that connects home TV set to PC-6001 A computer for use as a monitor. Use with PC-6071 A antenna switch.

PC-6082 A Data Recorder that expands storage and program access through use of cassette tapes. Requires PC-8093 cable.

PC-6052 Joystick that enhances game action and easily plugs into the joystick ports of the PC-6001 A .

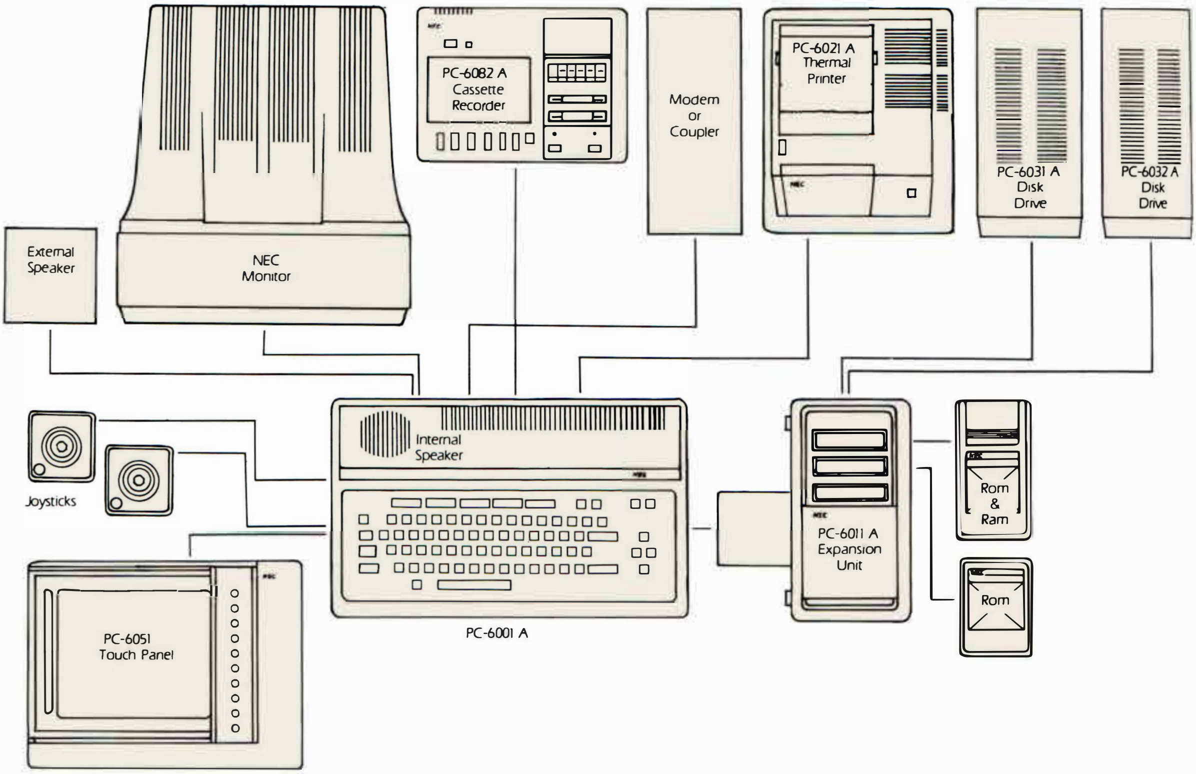
PC-6000 A Series Product Table

DESCRIPTION	MODEL NUMBER
CPU MAIN UNIT	PC-6001 A
ROM CARTRIDGE	PC-6005 A
ROM & RAM CARTRIDGE	PC-6006 A
40 CHARACTER THERMAL PRINTER	PC-6021 A
MINI FLOPPY DISK UNIT	PC-6031 A
12″ GREEN DISPLAY	JB1201 or JB1260
12″ COLOR DISPLAY	JC-1212
DIGITIZER (TOUCH PANEL)	PC-6051 A
TV/COMPUTER SWITCH BOX	PC-6071 A
CABLE, MONITOR/SOUND	PC-6092 A
CABLE, PC-6061 A	PC-6093 A
CABLE, PRINTER	PC-6094 A
9″ GREEN DISPLAY	JB902
CABLE, DATA RECORDER	PC-8093 A
DATA RECORDER	PC-6082 A
JOYSTICK	PC-6052 A
DISK DRIVE CABLE	PC-6031 A
EXPANSION UNIT	PC-6011 A
EXPANSION DRIVE	PC-6032 A

System Specifications

System diagram

A diagram of the PC-6001 A series is shown below.


PC-6082 A Cassette Recorder
Modem or Coupler
PC-6021 A Thermal Printer
PC-6031 A Disk Drive
PC-6032 A Disk Drive
External Speaker
NEC Monitor
Internal Speaker
Joysticks
PC-6001 A
PC-6011 A Expansion Unit
Rom & Ram
Rom
PC-6051 Touch Panel

System Specifications

1. CPU

UPD780C-1 (Z80A compatible), 4 MHz

2. Memory

ROM	16K BASIC interpreter) (This can be expanded up to 32K using the ROM or the ROM & RAM cartridge). 16K microsoft BASIC RAM (16x16) 16K Application ROM
RAM	16K (This can be expanded up to 32K using the ROM & RAM cartridge).

3. CRT

composition	Composed of upper and lower case alphabetic characters, number and symbols, graphics, greek characters and special characters.
Number of characters	32 characters X 16 lines
Graphic Function	:256 X 192 dots (Monochrome) 128 X 1982 dots (four color combinations: Green/yellow/, Blue/red, or Cyan/magenta, Orange/white 64 X 48 dots (nine colors)

Also, superimposing of characters and graphics can be done.

4. Cassette Interface

FSK System (600 or 1200 baud)

5. Printer Interface

Centronics Standard Parallel
Optional Printer Cable PC-6094 A

6. General Purpose Parallel Ports

can be connected to two Joysticks or the PC-6051 Touch Panel.

7. CRT Interface

can be connected to an ordinary TV receiver (through a built in RF interface) or to the video monitor (through a built in video composite interface)

8 Music Function

features three voice generators and one noise generator capable of playing a treble chord. Has sound volume. Can be connected to an external speaker

9. External Bus

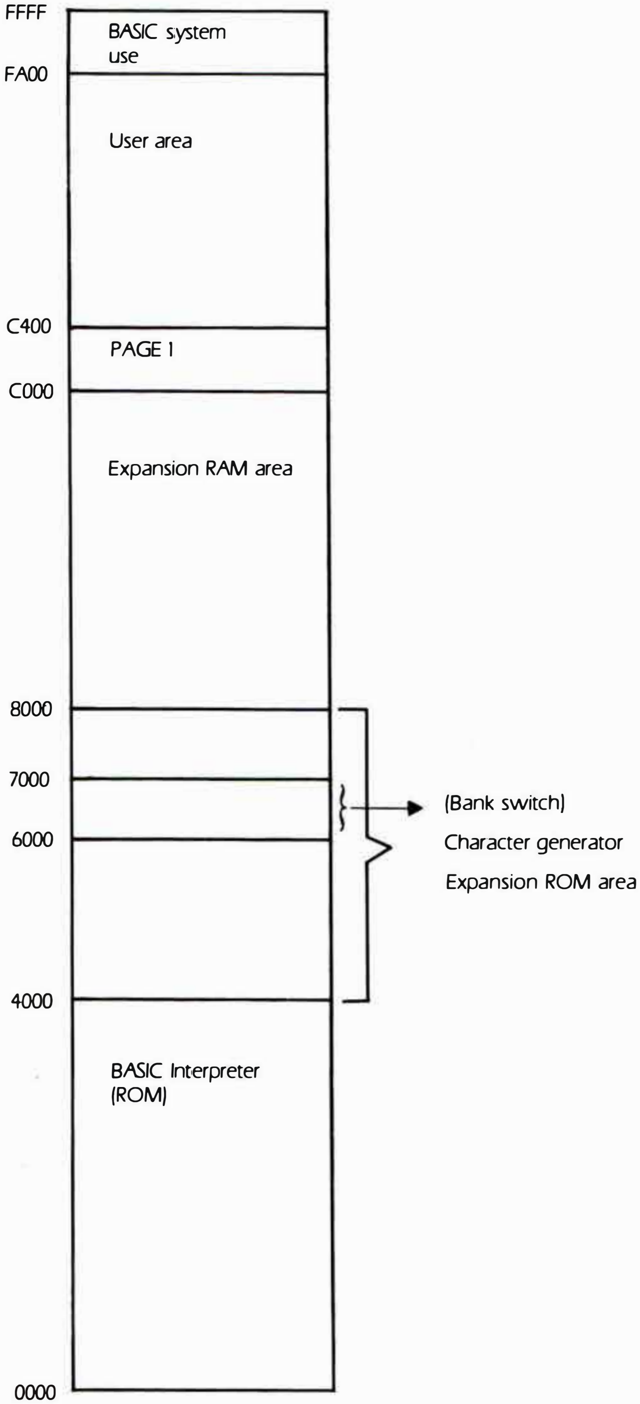
allows connection of ROM or ROM & RAM cartridge. Mini Floppy Disk Drive can be connected.

10. RS-232C Interface (optional)

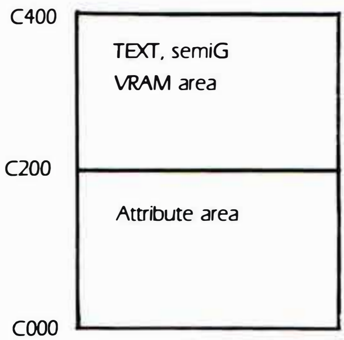
allows you to select 300, 600, 1200, 2400 or 4800 baud data transmission.

Memory Maps

The illustration below shows the memory map when only VRAM page 1 used with a 16k base system.


FFFF
BASIC system use
FA00
User area
C400
PAGE 1
C000
Expansion RAM area
8000
7000
6000
4000
(Bank switch)
Character generator
Expansion ROM area
BASIC Interpreter (ROM)
0000

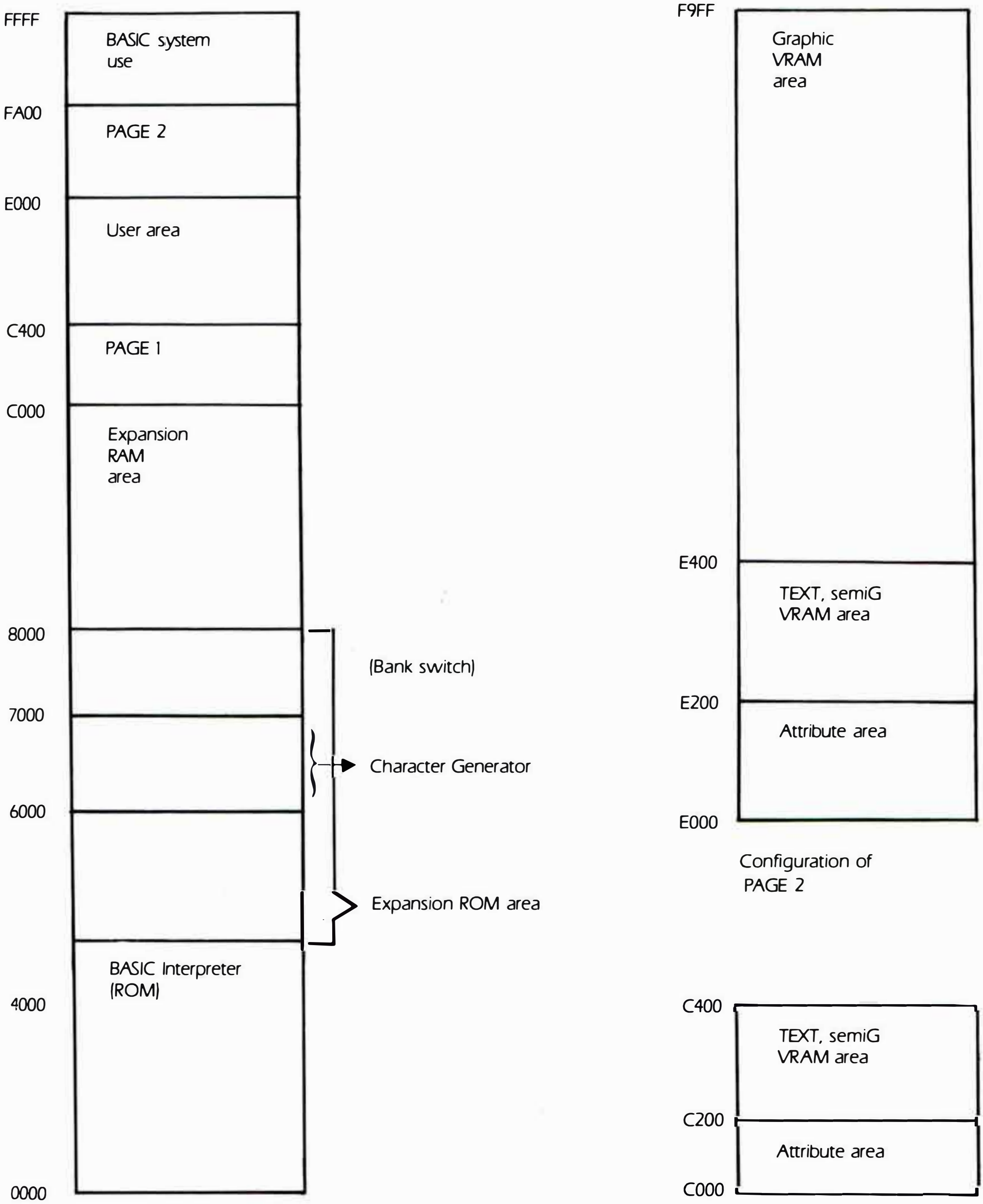
Memory map Diagram 1


C400
TEXT, semiG VRAM area
C200
Attribute area
C000

Configuration of PAGE 1

* User area is 13.5K Bytes between C400H and F9FFH.

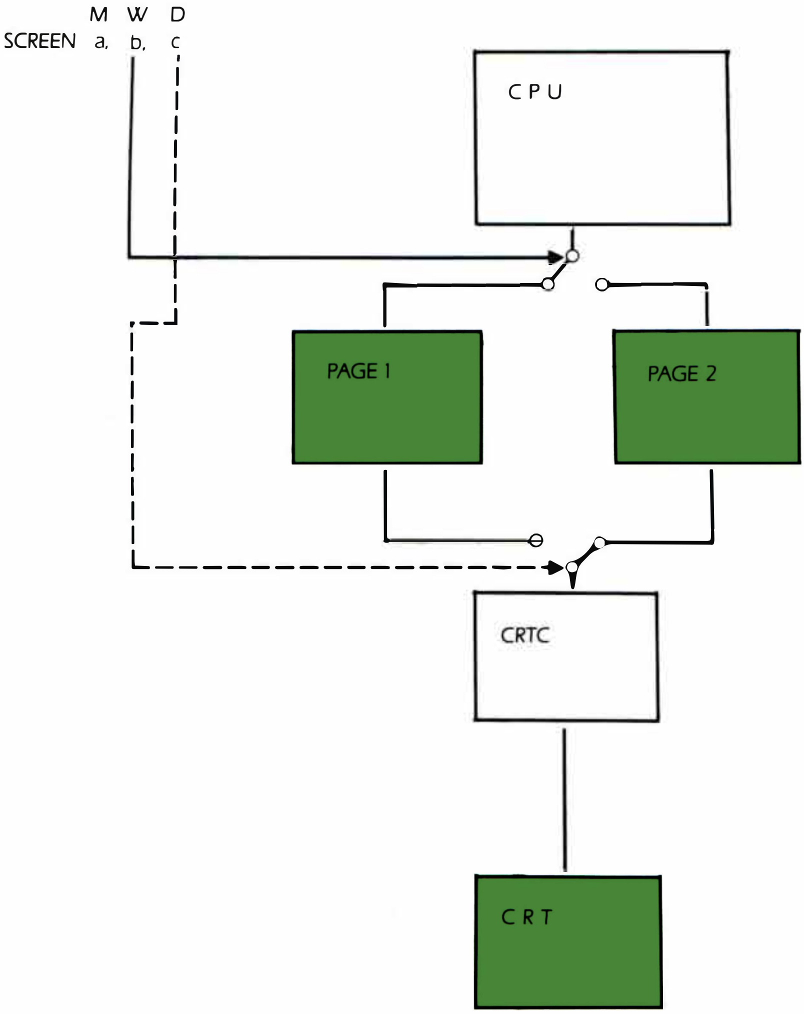
The illustration below shows the memory map when VRAM PAGE 1, PAGE 2 are used with 16K base system.


FFFF
BASIC system use
FA00
PAGE 2
E000
User area
C400
PAGE 1
C000
Expansion RAM area
8000
(Bank switch)
7000
Character Generator
6000
Expansion ROM area
BASIC Interpreter (ROM)
4000
0000
F9FF
Graphic VRAM area
E400
TEXT, semiG VRAM area
E200
Attribute area
E000
Configuration of PAGE 2
C400
TEXT, semiG VRAM area
C200
Attribute area
C000

Memory map Diagram 2

* The User area is 7K Bytes between C400H and DFFFH.

The chart below shows the switching between PAGE 1 and PAGE 2 by the SCREEN command.


M W D
SCREEN a, b, c
CPU
PAGE 1
PAGE 2
CRTC
CRT

M A: sets the display mode of the PAGE to be set by parameter B.
W B: sets the PAGE in which the graphic command is available.
D C: sets the PAGE to be output to the CRT.

The memory maps on the following pages are of the 32K Byte RAM System (together with the PC-6006 A ROM/RAM cartridge.)

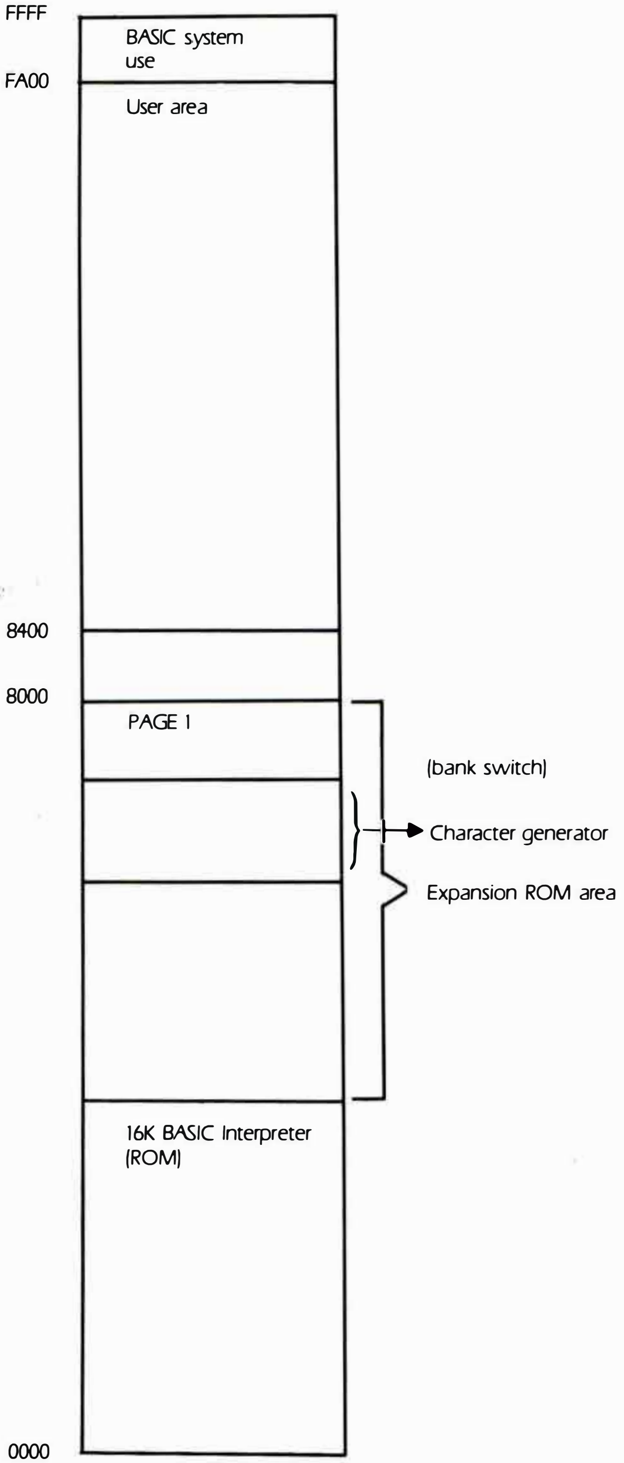
The VRAM area for TEXT is placed between 8000H and 83FFH in the 32K Byte RAM System. The system area of N-60 BASIC is between FA00H and FFFFH. The rest of memory (between 8400H and F9FFH will be used as both user areas and the VRAM area for high graphics. The setting of VRAM for high graphics is defined by the number that is input at 'HOW MANY PAGES? which is displayed after the power is turned on.

When prompted, "HOW MANY PAGES?", a value from 1 to 4 can be input (any other values are not acceptable). The memory maps correspond to each value from '1' to '4' are shown on the following pages.

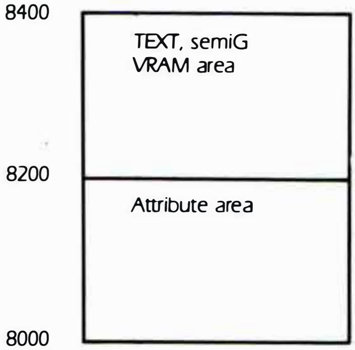
The available modes in PAGE 1 are TEXT and semigraphics. In PAGE 2 to PAGE 4, there are four modes available: TEXT, semigraphics, color graphics and high resolution graphics.

32K RAM SYSTEM

When '1' is input (only PAGE 1 is used).


FFFF
BASIC system use
FA00
User area
8400
8000
PAGE 1
(bank switch)
Character generator
Expansion ROM area
16K BASIC Interpreter (ROM)
0000

Memory map Diagram 3

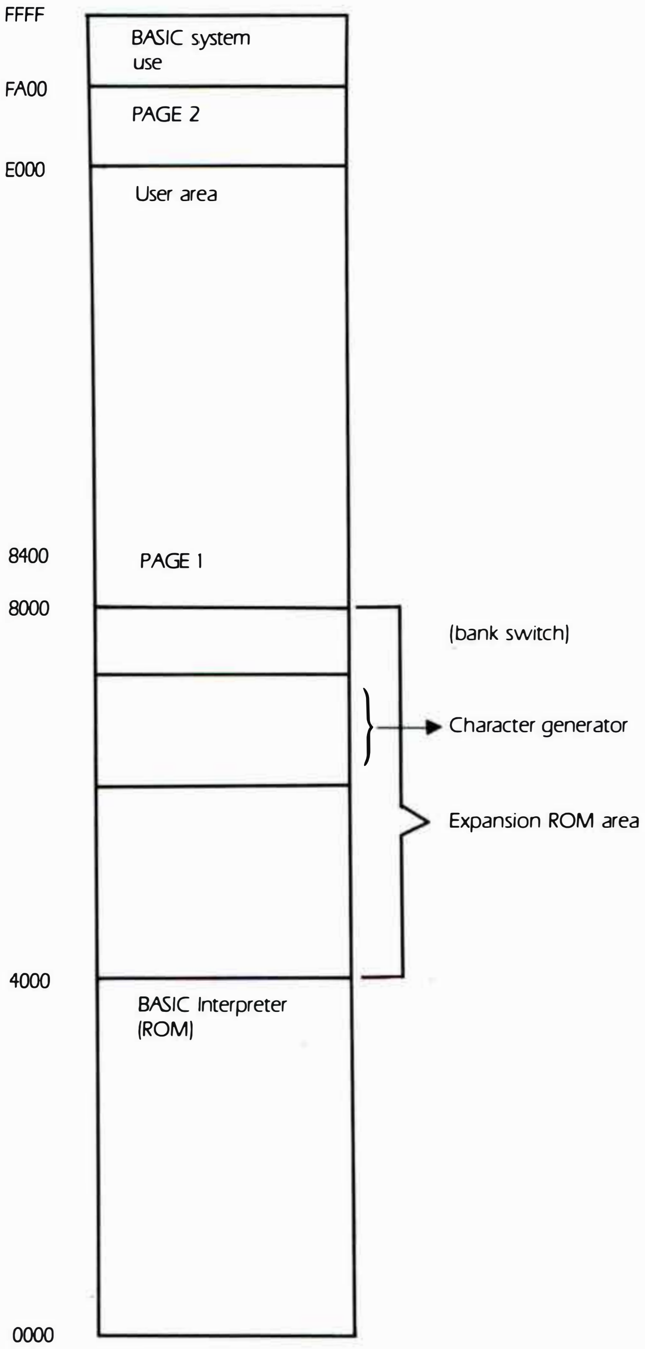

8400
TEXT, semiG VRAM area
8200
Attribute area
8000

Configuration of PAGE 1

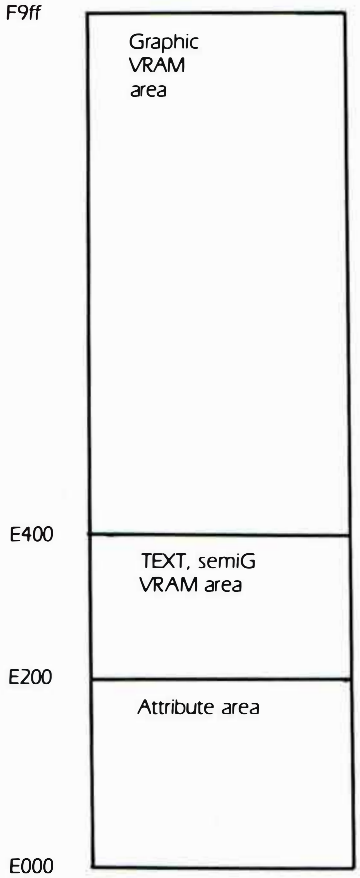
* The user area is 29.5K Bytes between 8400H and F9FFH.

32K RAM SYSTEM

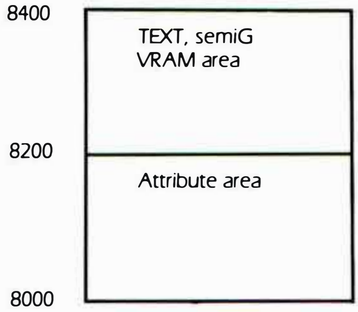
When '2' is input (PAGE 1,2 are used)


FFFF
BASIC system use
FA00
PAGE 2
E000
User area
8400
PAGE 1
8000
(bank switch)
Character generator
Expansion ROM area
4000
BASIC Interpreter (ROM)
0000

Memory map Diagram 4


F9ff
Graphic VRAM area
E400
TEXT, semiG VRAM area
E200
Attribute area
E000

Configuration of PAGE 2

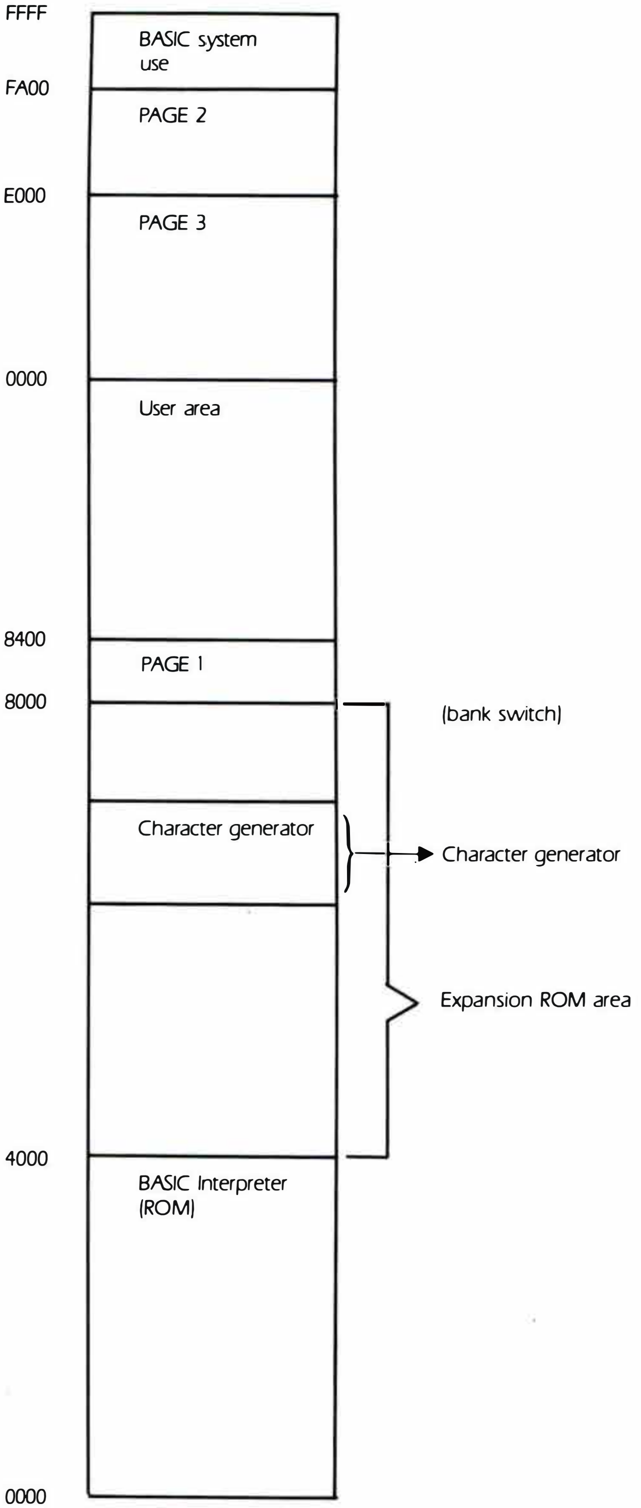

8400
TEXT, semiG VRAM area
8200
Attribute area
8000

Configuration of PAGE 1

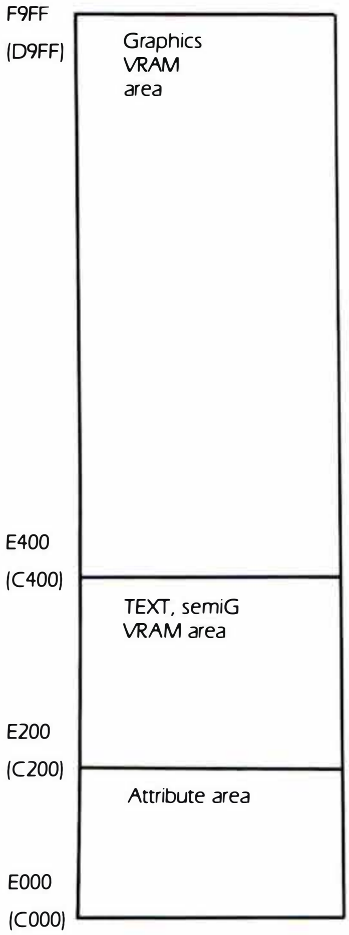
* The user area is 23k Bytes between 8400H and DFFFH.

32K RAM SYSTEM

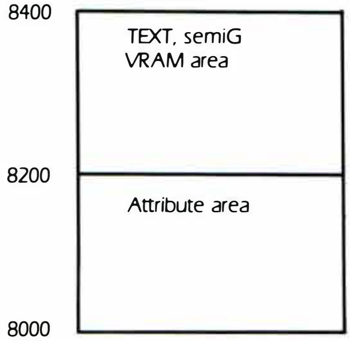
When '3' is input (PAGE 1,2,3 are used)


FFFF
BASIC system use
FA00
PAGE 2
E000
PAGE 3
0000
User area
8400
PAGE 1
8000
(bank switch)
Character generator
Character generator
Expansion ROM area
4000
BASIC Interpreter (ROM)
0000

Memory map Diagram 5


F9FF
(D9FF)
Graphics VRAM area
E400
(C400)
TEXT, semiG VRAM area
E200
(C200)
Attribute area
E000
(C000)

Configuration of PAGE 2(3)

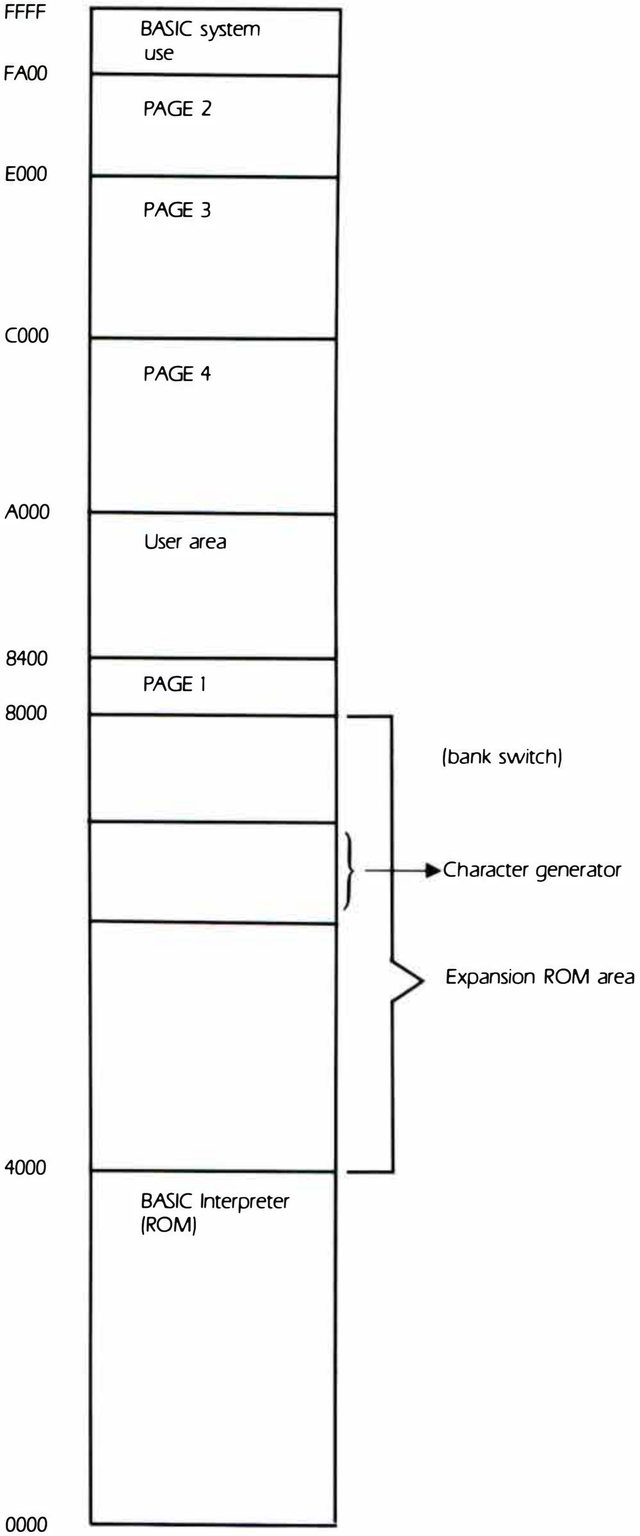

8400
TEXT, semiG VRAM area
8200
Attribute area
8000

Configuratin of PAGE 1.

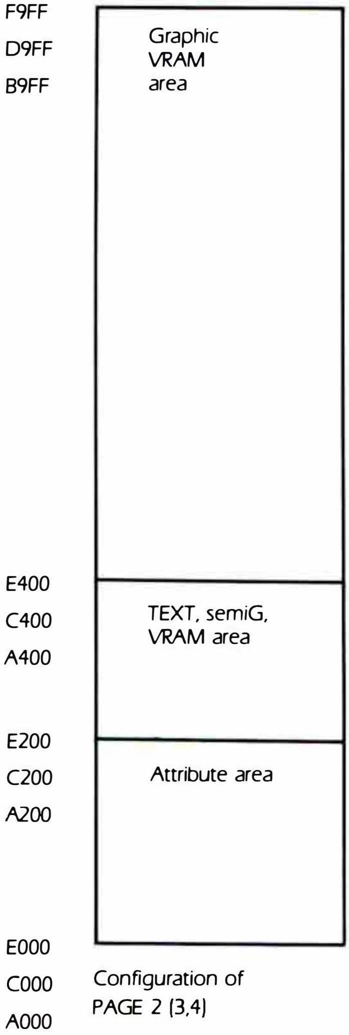
* The User area is 15K Bytes between 8400H and BFFFH.

32K RAM SYSTEM

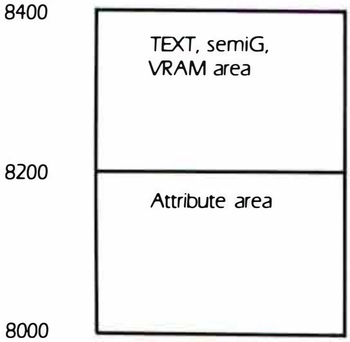
When '4' is input (PAGE 1,2,3,4 are used)


FFFF
BASIC system use
FA00
PAGE 2
E000
PAGE 3
C000
PAGE 4
A000
User area
8400
PAGE 1
8000
(bank switch)
Character generator
Expansion ROM area
4000
BASIC Interpreter (ROM)
0000

Memory map Diagram 6


F9FF
D9FF
B9FF
Graphic VRAM area
E400
C400
A400
TEXT, semiG, VRAM area
E200
C200
A200
Attribute area
E000
C000
A000

Configuration of PAGE 2 (3,4)

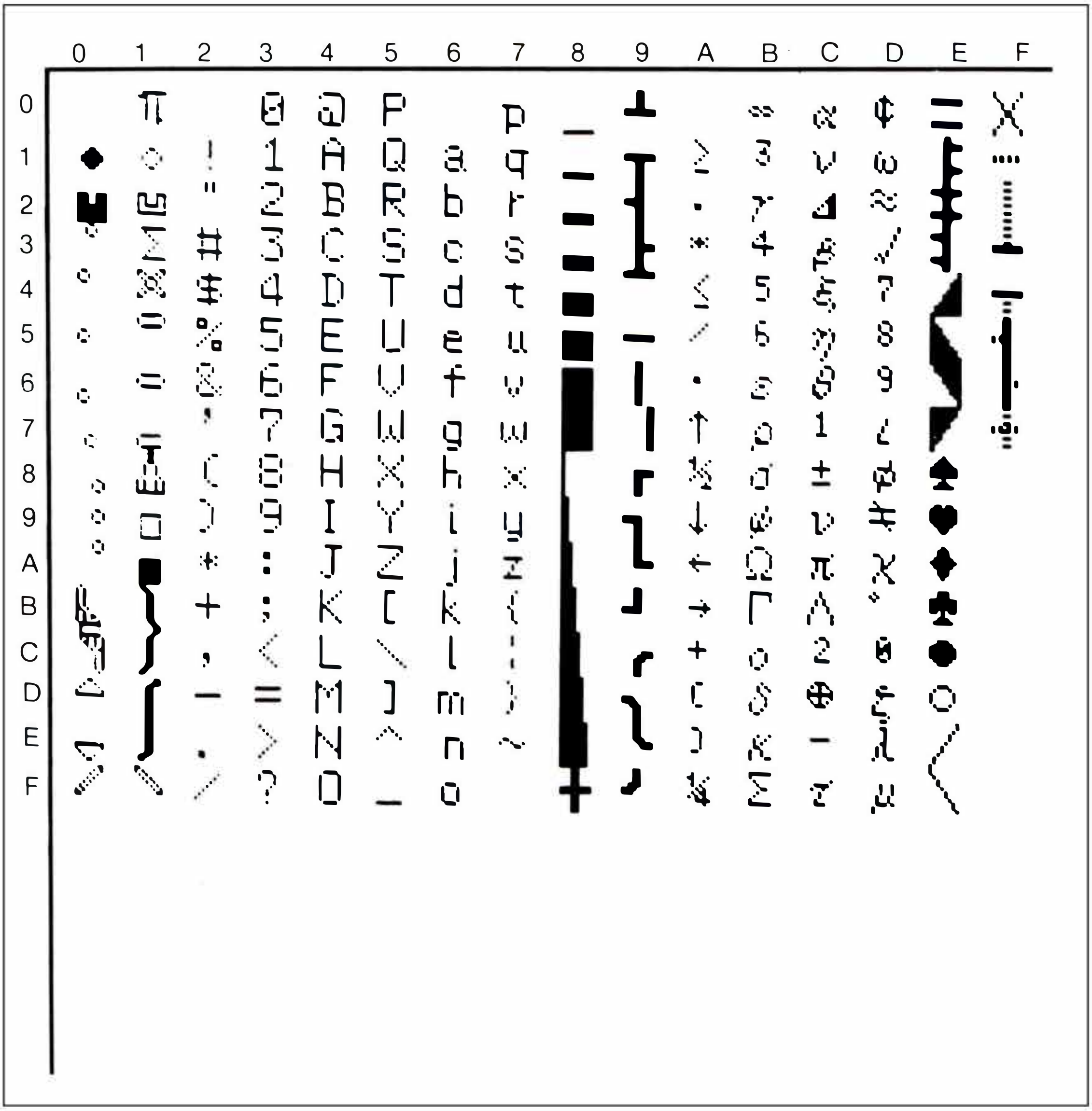

8400
TEXT, semiG, VRAM area
8200
Attribute area
8000

Configuratin of PAGE 1.

* The user area is 7K Bytes between 8400H and 9FFFH.

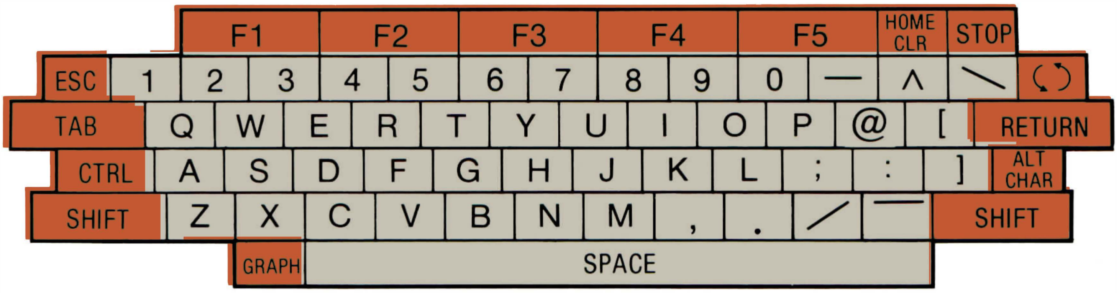
Keyboard Character Charts

The following is the PC-6001 A Character Code Chart.

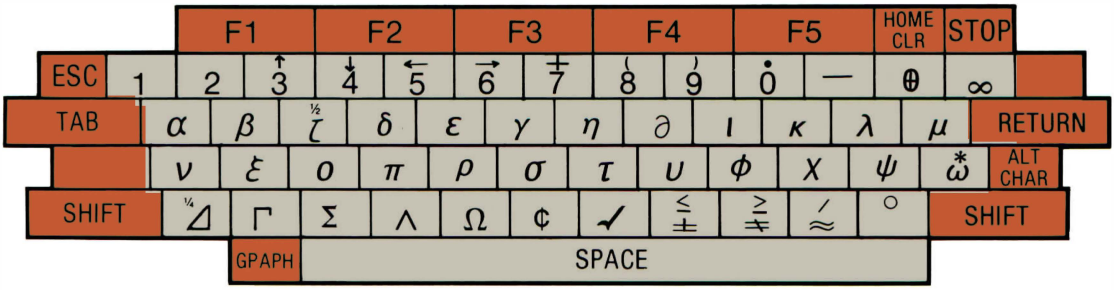

0 1 2 3 4 5 6 7 8 9 A B C D E F
0 1 2 3 4 5 6 7 8 9 A B C D E F

Alternate Character Set and Special Characters

The chart below shows the location of special characters and alternate characters that can be accessed at any time on the PC-6001 A .

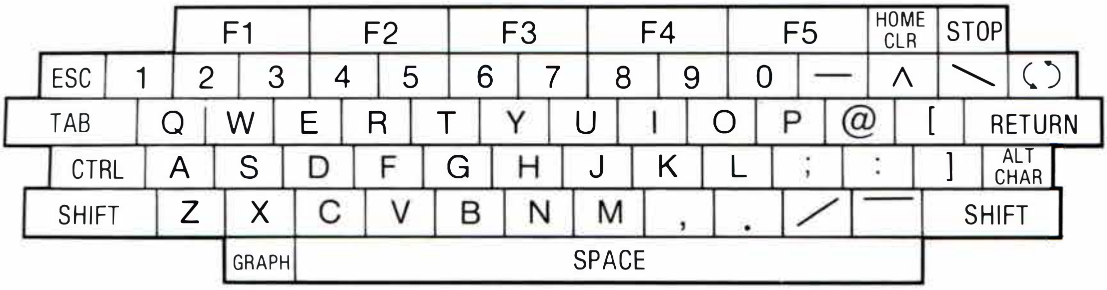

F1 F2 F3 F4 F5 HOME CLR STOP
ESC 1 2 3 4 5 6 7 8 9 0 — ^ \
TAB Q W E R T Y U I O P @ [RETURN
CTRL A S D F G H J K L ; :] ALT CHAR
SHIFT Z X C V B N M , . / — SHIFT
GRAPH SPACE

This alternate character set will replace the standard set above when **ALT CHAR** is depressed.

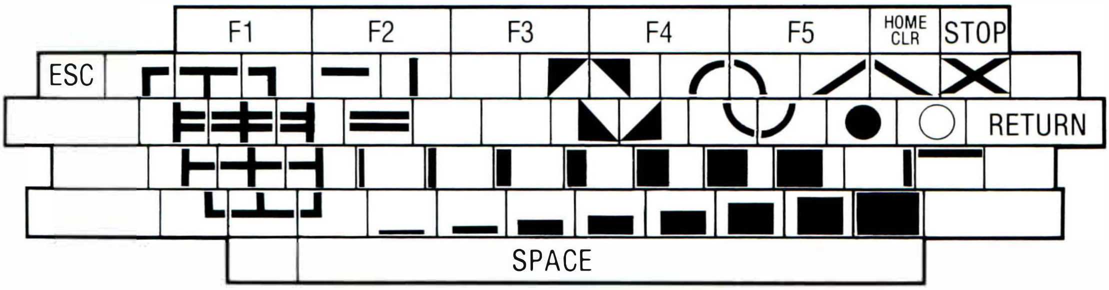

F1 F2 F3 F4 F5 HOME CLR STOP
ESC 1 2 ↑3 ↓4 ←5 →6 ┼7 (8)9 •0 — θ ∞
TAB α β ½ ζ δ ε γ η ∂ ι κ λ μ RETURN
ν ξ ο π ρ σ τ υ φ χ ψ * ω ALT CHAR
SHIFT ¼ Δ Γ Σ Λ Ω ¢ ✓ ≤ ± ≥ ∓ ⁄ ≈ ○ SHIFT
GPAPH SPACE

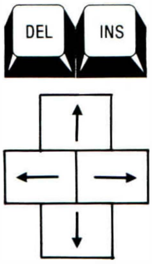
Graphic Symbol Locations

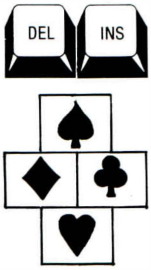
This page shows the locations of the Graphic Symbols on the keyboard. These keys can be accessed at any time on the PC-6001 A keyboard.


F1
F2
F3
F4
F5
HOME CLR
STOP
ESC
1
2
3
4
5
6
7
8
9
0
—
^
\
TAB
Q
W
E
R
T
Y
U
I
O
P
@
[
RETURN
CTRL
A
S
D
F
G
H
J
K
L
;
:
]
ALT CHAR
SHIFT
Z
X
C
V
B
N
M
,
.
/
SHIFT
GRAPH
SPACE

Below is an illustration of the graphic symbols that will replace the standard set pictured above when the **GRAPH** key is depressed.


F1
F2
F3
F4
F5
HOME CLR
STOP
ESC
RETURN
SPACE





Specifications for the PC-6000 A Series Components

The NEC PC-6000 A Series has optional components avaiable to be used with various applications

The following pages contain technical specifications for these components.

1. PC-6005 A ROM Cartridge Program ROM cartridges

   Mask ROM UPD2316E (2K), UPD2332 (4K) and UPD2364 (8K are available. (A maximum of two of the above mask ROM pieces can be used at one time) EPROM UPD2732D (4K) can also be used.

2 PC-6006 A ROM & RAM Cartridge

   The ROM & RAM cartridge is used when you want to expand RAM memory up to 32KB with eight pieces of UPD416C-3. Also, a maximum of two pieces (max 16KB) of the four kinds of ROM (described in item 1 above)

Specifications for the PC-6082 A Data Recorder

MODEL NUMBER	PC-6082 A
TAPE SPEED	4.75 cm/sec
Recording System	AC BIAS 2-TRACK MONOTRACK
Erasing System	Quasi-AC erasing
WOW & FLUTTER	0.16 percent WRMS
FREQUENCY RESPONSE	300-8000 HZ
POWER CONSUMPTION	5W115V
POWER SUPPLY	AC (± 10 percent) 60HZ
SPEAKER	16
INPUT/OUTPUT JACKS	CMT IN X1 CMT OUT X1 REMOTE X1 AUX X1
DIMENSIONS	247(W) X 72(H) X 188(D) mm 9 7(W) X 2.8(H) X 7.4(D) in
WEIGHT	1.4 kg. 3 lbs.
BAUD RATE	600 - 1200 BAUD (SOFTWARE SELECTABLE)

NOTE The PC-6082 A Data Recorder defaults to 1200 Baud. To CLOAD and CSAVE a program on cassette at 600 Baud, the following must be entered either in a program or at command level.

```
POKE &HFA1F, 0
```

To change the Baud rate back to 1200, enter:

```
POKE &HFA1F, &HFF
```

Specifications for the PC-6021 A Thermal Printer

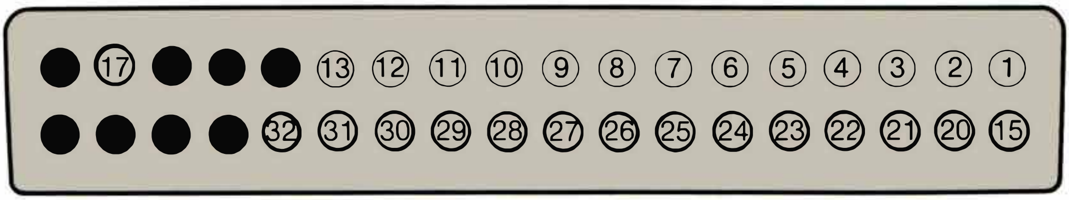
Interface	TTL level 8 bit parallel Standard Electronics parallel part
Dot Configuration	5 X 7 dot matrix
Columns	40 or 20 columns
Character Size	Width — 1.95 mm; 08 in. Height — 2.82 mm; .11 in.
Rated Voltage	115 V
Power Consumption	20 watts
Dimensions	246(W) x 95(H) x 270(D) mm 9.7(W) x 3.75(H) x 10 6(D) in.
Net Weight	2.7 kgs. 6 lbs.
Paper	Thermal roll paper 112mm (W) x 40 m (L) 4½ in (W) x 43. 75 yds

PC-6021 A is incorporating one board parallel interface of TTL level for 8 bit data.

TTL level 8 bit parrallel. (Standard Centronics)

Connector Output

The PC-6094 A cable that is used to drive the PC-6021 A printer has the following pin configuration on the 36P connector.

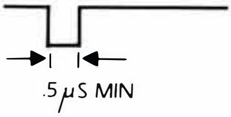
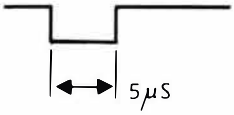
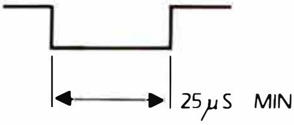


○ To be connected

◯ GND

● connection not needed

PIN		PIN	
1	DATA STROBE	19	GROUND
2	DATA 0	20	GROUND
3	DATA 1	21	GROUND
4	DATA 2	22	GROUND
5	DATA 3	23	GROUND
6	DATA 4	24	GROUND
7	DATA 5	25	GROUND
8	DATA 6	26	GROUND
9	DATA 7	27	GROUND
10	ACKNOWLEDGE	28	GROUND
11	BUSY	29	GROUND
12	RESET	30	GROUND
13	SELECT	31	GROUND
14	NO CONNECTION	32	GROUND
15	NO CONNECTION	33	NO CONNECTION
16	NO CONNECTION	34	NO CONNECTION
17	GROUND	35	NO CONNECTION
18	NO CONNECTION	36	NO CONNECTION

PIN #	SIGNAL	INPUT	EXPLANATION
1	$\overline{\text{STROBE}}$	INPUT	DATA STORAGE SIGNAL. NEGATIVE LOGIC. The contents of Data-Bus are sent to printer by this signal. 
2	DATA 0	INPUT	DATABUS
9	DATA 7	INPUT	POSITIVE LOGIC
10	$\overline{\text{ACKNOWLEDGE}}$	OUTPUT	ACKNOWLEDGE SIGNAL. NEGATIVE. This is output after the printer has gathered a of the data. 
11	BUSY	OUTPUT	BUSY SIGANL POSITIVE LOGIC. When busy signal shows HI, any data cannot be accepted. When printer is ready to receive data, BUSY must be low.
12	$\overline{\text{RESET}}$	INPUT	RESET SIGNAL. NEGATIVE LOGIC. Printer returns initial condition. 
13	SELECT	OUTPUT	Printer is on-line at HI.
17	GND	———	Grounding
18	N.C.	———	No connection.
19	GND		
≀			
32	GND		Grounding

Special Programming Considerations for the Thermal Printer

The PC-6021 A Thermal Printer is capable of understanding special printing instructions from your programs. The commands are:

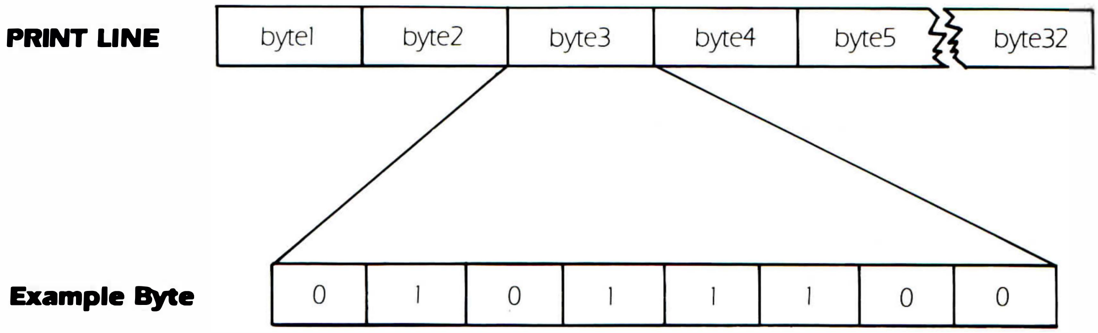
		Symbol	Decimal	Hexadecimal
1	Line Feed	L/F	10	0A
2	Form Feed	F/F	12	0C + DATA
3	Right Justified	RA	18	12
4	Graphic Print	GS	29	1D + DATA
5	Black/White Reverse	Reverse	20	14
6	Reset Mode	RS	30	1E
7	20 Digits per Line	US	31	1F

1. A line feed is executed after each 40 characters or 20 characters in the US command mode. This forces the printer to advance one line.

2. Form feed operates identically to the line feed but it also allows you to specify the number of lines to feed after 40 characters.

3. Right justified means that printing will be from right to left and that the first character of each line will begin at the same position.

4. Graphic commands changes the printer format to 256 dots per line. The printer will receive 32 bytes of data per line. If a byte is set to "1" a black dot will print.



Actual Print

Data is printed from left to right. Byte 1 will always be on the far left side of the paper. The graphic mode handles 128 lines of 32 byte transfers before it will automatically end.

5. Only within the graphic mode the printing will be reversed, black will print in place of what is normally white.

6. The reset mode will reset all previously set modes.

7. Character width is doubled to print double size characters. Instead of 40 characters per line, there will be 20 characters per line.

Sample Program

The sample BASIC program below shows all the commands available to PC-6001 A being used. By seeing the actual code the commands should be more understandable.

```
10    CLEAR 300, &HCFFF
20    LPRINT CHR$(30) ...................................... Mode Reset
30    FOR N=1 TO 80
40    LPRINT "1"; :NEXT N
50    FOR N=1 TO 200
60    LPRINT "8"; :NEXT N: LPRINT
70    LPRINT "left"; "left"; "left"
80    LPRINT CHR$(18); .................................... Right justified print
90    LPRINT "right"; "right"; "right"
100   LPRINT CHR$(31); .................................... 20 digits to a line
110   LPRINT "NEC PRINTER PC-6021(A)"
120   I=0
130   READ X$
140   IF X$="999" THEN GOTO 270
150   X=VAL ("&H" + X$)
160   POKE &HD000 + I, X
170   I = I + 1
180   GOTO 130
190   DATA cd, 09, d0, cd, 1c, d0, c9, 00, 00, 21         Machine program to
200   DATA 00, d8, 3e, 80, 1e, ff, 07, 16, 20, 77         output graphic data
210   DATA 23, 15, 20, fb, 1d, 20, f5, c9, 00, 00         to printer. See
220   DATA 00, 00, 00, 1e, 2e, 7b, cd, 38, d0, 21         machine code on
230   DATA 00, d8, 16, 20, 7e, 23, cd, 38, d0, 15         following pages.
240   DATA 20, f8, 1d, 20, f3, c9, f5, db, c0, cb
250   DATA 4f, 28, fa, f3, f1, 2f, d3, 91, 3e, 01
260   DATA d3, 93, af, d3, 93, fb, c9, 999
270   LPRINT CHR$(29);..................................... Graphic mode
280   EXEC &HD000 ......................................... Execute machine program
290   OUT &H91, &HEB ]..................................... Black/White Reverse
300   OUT &H93, &H01 |
310   OUT &H93, &H00_]
320   LPRINT CHR$(29); .................................... Graphic mode
330   EXEC &HD000 ......................................... Execute machine program
340   LPRINT CHR$(12); CHR$(10)                             Paper feed 10 lines
350   LPRINT CHR$(30);                                      Mode reset
360   END
```

Assembly Program Used in Sample Program

By using the EXEC command that is available to you, a program can be written in machine language. The sample program below shows the graphic abilities of machine language and makes the commands more understandable (for the assembly level programmer).

```
                  * * * * * * * * * * * * * * *
                  *  GRAPHICS PRINT TEST  *                      Graphics data print program
                  * * * * * * * * * * * * * * *
CD09D0      MAIN:         CALL         GRAPH                  Write graphic data to memory
CD1CD0                    CALL         GPOUT                  Output to printer
C9                        RET                                 Return to BASIC
00                        NOP
00                        NOP
                  * * * * * * * * * * * * * * *
                  *    SUBROUTINE FOR     *
                  *   GRAPHICS PATTERN    *                   Subroutine to write into
                  * * * * * * * * * * * * * * *               memory
2100D8      GRAPH:        LD           HL,0D800H              Store address of data
3E80                      LD           A, 80H                 Data
1EFF                      LD           E,0FFH                 Set no. of lines in E register
07          LOOP1:        RLCA                                Rotate data to left
1620                      LD           D,20H                  Set number of bytes per line
77          LOOP2:        LD           (HL),A                 in D register

23                        INC          HL
15                        DEC          D
20FB                      JR           NZ,LOOP2
1D                        DEC          E
20F5                      JR           E
C9                        RET          NZ,LOOP1
```

```
                ********************
                * SUBROUTINE FOR OUTPUT *
                *  THE GRAPHICS DATA    *             Output subroutine
                ********************
00          GPOUT:      NOP
00                      NOP
00                      NOP
00                      NOP
00                      NOP
1E2E                    LD          E,2EH
7B                      LD          A,E            Set number of lines to be
CD38D0                  CALL        PROUT          printed in E register
2100D8                  LD          HL,0D800H      Output data on number of
1620        LOOP3:      LD          D,20H          lines to printer
7E          LOOP4:      LD          A, (HL)        Set number of bytes per line
23                      INC         HL             in D register
CD38D0                  CALL        PROUT
15                      DEC         D
20F8                    JR          NZ, LOOP4      Output to printer
1D                      DEC         E
20F3                    JR          NZ,LOOP3
C9                      RET
                ********************
                *    SUBROUTINE FOR     *
                *  OUTPUT TO PRINTER    *             Data print subroutine
                ********************
F5          PROUT:      PUSH        AF             Evacuate data
DBC0        WAIT:       IN          A,0C0H
CD4F                    BIT         1,A            If BUSY signal·go to next step
28FA                    JR          Z,WAIT
F3                      DI                         Disable interrupt
F1                      POP         AF
2F                      CPL                        Restore data
D391                    OUT         91H,A          Output to printer
3E01                    LD          A,1
D393                    OUT         93H,A          Output STROBE signal =0 to
AF                      XOR         Z              printer
D393                    OUT         93H,A          Output STROBE signal = 1 to
FB                      EI                         printer
C9                      RET                        Release disable
```

Specifications for the PC-6031 A Disk Drive

The following pages contain technical specifications for the PC-6031 A Disk Drive and cables.

Standard

Dimensions: 4.75W x 7.2H x 10.4D inches
Weight: 9.5 lbs.
Power Supply: AC 115V 50/60 Hz
power consumption: 20W, 25W (two drives)
Working Condition: working temperature 10 - 35 degrees centigrade

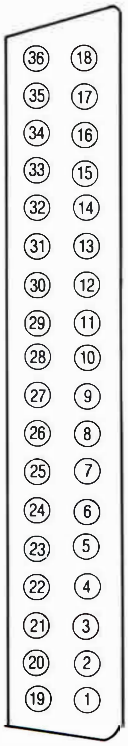
Data Memory Capacity

The diskettes used with the PC-6031 A disk drive are single sided, double density, 5¼ inch floppy disks.

Bytes per drive: 143.36K Bytes (user area is 139.26K)
Tracks per drive: 35 tracks
Sectors per track: 16 sectors
Data per sector: 256 bytes

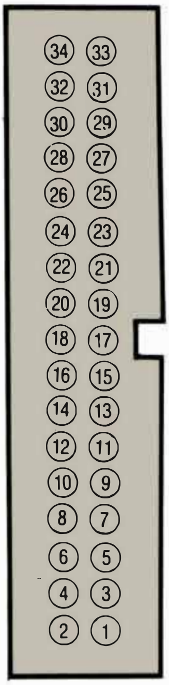
Cable Connection Pin Assignments

The illustration below shows the pin assignments for the disk cable.



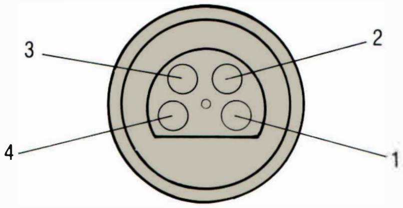
Pin		Pin	
1	PB0	19	PA0
2	PB1	20	PA1
3	PB2	21	PA2
4	PB3	22	PA3
5	PB4	23	PA4
6	PB5	24	PA5
7	PB6	25	PA6
8	PB7	26	PA7
9	Non-Connection	27	PC4
10		28	PC5
11		29	PC6
12		30	PC7
13		31	PC0
14	GND	32	PC1
15		33	PC2
16		34	PC3
17		35	RESET
18		36	GND

The illustration below shows the pin assignments for the disk cable of the Expansion Disk Drive (PC-6032 A).


34 33
32 31
30 29
28 27
26 25
24 23
22 21
20 19
18 17
16 15
14 13
12 11
10 9
8 7
6 5
4 3
2 1

Pi	Pin		
1	GND	18	DIRECTION
2	MON 2	19	GND
3	GND	20	STEP
4	HDLD	21	GND
5	GND	22	WRDATA
6	DS3	23	GND
7	GND	24	W E
8	INDEX	25	GND
9	GND	26	TRACK0
10	DS1	27	GND
11	GND	28	WRPROTECT
12	Non-Connection	29	GND
13	GND	30	RDDATA
14	DS2	31	GND
15	GND	32	SIDE
16	MON1	33	GND
17	GND	34	MON3

The illustration below shows the pin assignment for the Expansion Power connector which is used to connect the PC-6031 A to the PC-6032 A .



Pin	
1	+ 5V
2	GND
3	GND
4	+ 12V

Specifications for the PC-6051 Touch Panel

Working surface size:

X - axis	175 + 5 mm; 6.9 in.
Y - axis	149 + 3 mm; 5.9 in.

Resolution:

X - axis	0.70 mm; .027 in.
Y - axis	0.58 mm; .023 in.

x, y position coordinates are provided within 00 to 0FFH 8 bits data.

Linearity error:
± 1/2 LSB (max)

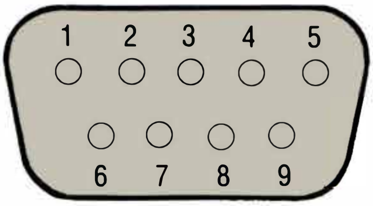
Interface:
TTL serial

Power Supply:
DC 5V (± 5%) 38 mA

Dimensions:
327(W) X 45(H) X 248(D) mm
12.9(W) X 1.75(H) X 9.75(D) in.

Weight:
800 grams; 1.75 pounds

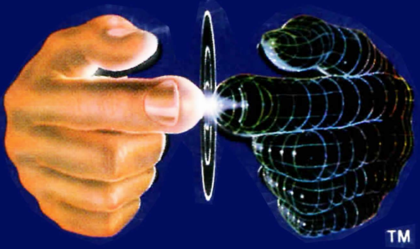
Pin assignment:



PIN NO.	**SYMBOL**	**DESCRIPTION**	**IN/OUT**
1	$\overline{\mathrm{sense}}$	touch sense	out
2	EOC	AD conversion end	out
3	SO	serial output	out
4	N.C.	no connection	—
5	$\overline{\mathrm{DCSV}}$	DC 5V	—
6	SCK	serial clock	in
7	SI	serial input	in
8	$\overline{\mathrm{CS}}$	select signal	in
9	GND	signal ground	—

© 1982 NEC Home Electronics (U.S.A.), Inc.
Personal Computer Division
NEC Corporation

All rights reserved. No part of this publication may be reproduced in whole or in part without the prior written permission of NEC Home Electronics (U.S.A.), Inc.



Adventure at your fingertips

NEC

NEC Home Electronics (U.S.A.), Inc.
Personal Computer Division
1401 Estes Avenue
Elk Grove Village, IL 60007

NEC Corporation